

$$I(J^P) = \frac{1}{2}(0^-)$$

## **D $\pm$ MASS**

The fit includes  $D^\pm$ ,  $D^0$ ,  $D_s^\pm$ ,  $D^{*\pm}$ ,  $D^{*0}$ , and  $D_s^{*\pm}$  mass and mass difference measurements.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1869.62 ± 0.20 OUR FIT</b>				Error includes scale factor of 1.1.
<b>1869.5 ± 0.5 OUR AVERAGE</b>				
1870.0 ± 0.5 ± 1.0	317	BARLAG	90C	ACCM $\pi^-$ Cu 230 GeV
1869.4 ± 0.6		<sup>1</sup> TRILLING	81	RVUE $e^+ e^-$ 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1875 ± 10	9	ADAMOVICH	87	EMUL Photoproduction
1860 ± 16	6	ADAMOVICH	84	EMUL Photoproduction
1863 ± 4		DERRICK	84	HRS $e^+ e^-$ 29 GeV
1868.4 ± 0.5		<sup>1</sup> SCHINDLER	81	MRK2 $e^+ e^-$ 3.77 GeV
1874 ± 5		GOLDHABER	77	MRK1 $D^0, D^+$ recoil spectra
1868.3 ± 0.9		<sup>1</sup> PERUZZI	77	MRK1 $e^+ e^-$ 3.77 GeV
1874 ± 11		PICCOLO	77	MRK1 $e^+ e^-$ 4.03, 4.41 GeV
1876 ± 15	50	PERUZZI	76	MRK1 $K^\mp \pi^\pm \pi^\pm$

<sup>1</sup> PERUZZI 77 and SCHINDLER 81 errors do not include the 0.13% uncertainty in the absolute SPEAR energy calibration. TRILLING 81 uses the high precision  $J/\psi(1S)$  and  $\psi(2S)$  measurements of ZHOLENTZ 80 to determine this uncertainty and combines the PERUZZI 77 and SCHINDLER 81 results to obtain the value quoted.

## **D $\pm$ MEAN LIFE**

Measurements with an error  $> 100 \times 10^{-15}$  s have been omitted from the Listings.

VALUE ( $10^{-15}$ s)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1040 ± 7 OUR AVERAGE</b>				
1039.4 ± 4.3 ± 7.0	110k	LINK	02F	FOCS $\gamma$ nucleus, $\approx$ 180 GeV
1033.6 ± 22.1 ± 9.9	3777	BONVICINI	99	CLE2 $e^+ e^-$ $\approx \Upsilon(4S)$
1048 ± 15 ± 11	9k	FRAEBETTI	94D	E687 $D^+ \rightarrow K^- \pi^+ \pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1075 ± 40 ± 18	2455	FRAEBETTI	91	E687 $\gamma$ Be, $D^+ \rightarrow K^- \pi^+ \pi^+$
1030 ± 80 ± 60	200	ALVAREZ	90	NA14 $\gamma, D^+ \rightarrow K^- \pi^+ \pi^+$
1050 ± 77 ± 72	317	<sup>2</sup> BARLAG	90C	ACCM $\pi^-$ Cu 230 GeV
1050 ± 80 ± 70	363	ALBRECHT	88I	ARG $e^+ e^-$ 10 GeV
1090 ± 30 ± 25	2992	RAAB	88	E691 Photoproduction

<sup>2</sup> BARLAG 90C estimates the systematic error to be negligible.

## **$D^+$ DECAY MODES**

Most decay modes (other than the semileptonic modes) that involve a neutral  $K$  meson are now given as  $K_S^0$  modes, not as  $\bar{K}^0$  modes. Nearly always it is a  $K_S^0$  that is measured, and interference between Cabibbo-allowed and doubly Cabibbo-suppressed modes can invalidate the assumption that  $2\Gamma(K_S^0) = \Gamma(\bar{K}^0)$ .

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
<b>Inclusive modes</b>		
$\Gamma_1 e^+ \text{anything}$	(16.1 $\pm 0.4$ ) %	
$\Gamma_2 \mu^+ \text{anything}$		
$\Gamma_3 K^- \text{anything}$	(27.5 $\pm 2.4$ ) %	
$\Gamma_4 \bar{K}^0 \text{anything} + K^0 \text{anything}$	(61 $\pm 5$ ) %	
$\Gamma_5 K^+ \text{anything}$	( 5.5 $\pm 1.6$ ) %	
$\Gamma_6 K^*(892)^- \text{anything}$	( 6 $\pm 5$ ) %	
$\Gamma_7 \bar{K}^*(892)^0 \text{anything}$	(23 $\pm 5$ ) %	
$\Gamma_8 K^*(892)^+ \text{anything}$	< 20.3 %	CL=90%
$\Gamma_9 K^*(892)^0 \text{anything}$	< 6.6 %	CL=90%
$\Gamma_{10} \eta \text{anything}$	( 6.3 $\pm 0.7$ ) %	
$\Gamma_{11} \eta' \text{anything}$	( 1.04 $\pm 0.18$ ) %	
$\Gamma_{12} \phi \text{anything}$	( 1.03 $\pm 0.12$ ) %	
$\Gamma_{13} \phi e^+ \text{anything}$		
<b>Leptonic and semileptonic modes</b>		
$\Gamma_{14} e^+ \nu_e$	< 2.4 $\times 10^{-5}$	CL=90%
$\Gamma_{15} \mu^+ \nu_\mu$	( 4.4 $\pm 0.7$ ) $\times 10^{-4}$	
$\Gamma_{16} \tau^+ \nu_\tau$	< 2.1 $\times 10^{-3}$	
$\Gamma_{17} \bar{K}^0 \ell^+ \nu_\ell$	[a]	
$\Gamma_{18} \bar{K}^0 e^+ \nu_e$	( 8.6 $\pm 0.5$ ) %	
$\Gamma_{19} \bar{K}^0 \mu^+ \nu_\mu$	( 9.6 $\pm 0.8$ ) %	S=1.1
$\Gamma_{20} K^- \pi^+ e^+ \nu_e$	( 4.1 $\pm 0.6$ ) %	S=1.1
$\Gamma_{21} \bar{K}^*(892)^0 e^+ \nu_e,$ $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	( 3.71 $\pm 0.21$ ) %	
$\Gamma_{22} K^- \pi^+ e^+ \nu_e \text{ nonresonant}$	< 7 $\times 10^{-3}$	CL=90%
$\Gamma_{23} K^- \pi^+ \mu^+ \nu_\mu$	( 4.0 $\pm 0.5$ ) %	
$\Gamma_{24} \bar{K}^*(892)^0 \mu^+ \nu_\mu,$ $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	( 3.7 $\pm 0.3$ ) %	
$\Gamma_{25} K^- \pi^+ \mu^+ \nu_\mu \text{ nonresonant}$	( 2.1 $\pm 0.6$ ) $\times 10^{-3}$	
$\Gamma_{26} (\bar{K}^*(892)\pi)^0 e^+ \nu_e$	< 1.2 %	CL=90%
$\Gamma_{27} (\bar{K}\pi\pi)^0 e^+ \nu_e \text{ non-} \bar{K}^*(892)$	< 9 $\times 10^{-3}$	CL=90%
$\Gamma_{28} K^- \pi^+ \pi^0 \mu^+ \nu_\mu$	< 1.7 $\times 10^{-3}$	CL=90%
$\Gamma_{29} \pi^0 e^+ \nu_e$	( 4.4 $\pm 0.7$ ) $\times 10^{-3}$	

$\Gamma_{30}$	$\pi^0 \ell^+ \nu_\ell$	[a]		
$\Gamma_{31}$	$\rho^0 e^+ \nu_e$		$(2.2 \pm 0.4) \times 10^{-3}$	
$\Gamma_{32}$	$\rho^0 \mu^+ \nu_\mu$		$(2.5 \pm 0.5) \times 10^{-3}$	
$\Gamma_{33}$	$\omega e^+ \nu_e$		$(1.6^{+0.7}_{-0.6}) \times 10^{-3}$	
$\Gamma_{34}$	$\phi e^+ \nu_e$	< 2.01	%	CL=90%
$\Gamma_{35}$	$\phi \mu^+ \nu_\mu$	< 2.04	%	CL=90%
$\Gamma_{36}$	$\eta \ell^+ \nu_\ell$	< 7	$\times 10^{-3}$	CL=90%
$\Gamma_{37}$	$\eta'(958) \mu^+ \nu_\mu$	< 1.1	%	CL=90%

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

$\Gamma_{38}$	$\bar{K}^*(892)^0 e^+ \nu_e$	$(5.56 \pm 0.32) \%$	S=1.2
$\Gamma_{39}$	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$	$(5.5 \pm 0.5) \%$	S=1.1
$\Gamma_{40}$	$\bar{K}_1(1270)^0 \mu^+ \nu_\mu$	< 4	% CL=95%
$\Gamma_{41}$	$\bar{K}^*(1410)^0 \mu^+ \nu_\mu$		
$\Gamma_{42}$	$\bar{K}_0^*(1430)^0 \mu^+ \nu_\mu$	< 2.5	$\times 10^{-4}$
$\Gamma_{43}$	$\bar{K}_2^*(1430)^0 \mu^+ \nu_\mu$	< 1.1	% CL=95%
$\Gamma_{44}$	$\bar{K}^*(1680)^0 \mu^+ \nu_\mu$	< 1.6	$\times 10^{-3}$

### Hadronic modes with a $\bar{K}$ or $\bar{K}\bar{K}\bar{K}$

$\Gamma_{45}$	$K_S^0 \pi^+$	$(1.47 \pm 0.06) \%$	S=1.1
$\Gamma_{46}$	$K^- \pi^+ \pi^+$	[b] $(9.51 \pm 0.34) \%$	S=1.1
$\Gamma_{47}$	$(K^- \pi^+)_{S\text{-wave}} \pi^+$	$(7.47 \pm 0.34) \%$	
$\Gamma_{48}$	$\bar{K}_0^*(800)^0 \pi^+, \bar{K}_0^*(800) \rightarrow$	[c]	
$\Gamma_{49}$	$\bar{K}^*(892)^0 \pi^+,$ $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	[c] $(1.13 \pm 0.20) \%$	
$\Gamma_{50}$	$\bar{K}_0^*(1430)^0 \pi^+,$ $\bar{K}_0^*(1430)^0 \rightarrow K^- \pi^+$	[c]	
$\Gamma_{51}$	$\bar{K}_2^*(1430)^0 \pi^+,$ $\bar{K}_2^*(1430)^0 \rightarrow K^- \pi^+$	[c] $(1.9 \pm 1.3) \times 10^{-4}$	
$\Gamma_{52}$	$\bar{K}^*(1680)^0 \pi^+,$ $\bar{K}^*(1680)^0 \rightarrow K^- \pi^+$	[c] $(1.1 \pm 1.3) \times 10^{-3}$	
$\Gamma_{53}$	$K^- \pi^+ \pi^+ \text{ nonresonant}$	[c]	
$\Gamma_{54}$	$K_S^0 \pi^+ \pi^0$	[b] $(7.0 \pm 0.5) \%$	S=1.3
$\Gamma_{55}$	$K_S^0 \rho^+$	$(4.7 \pm 1.1) \%$	
$\Gamma_{56}$	$\bar{K}^*(892)^0 \pi^+,$ $\bar{K}^*(892)^0 \rightarrow K_S^0 \pi^0$	$(1.3 \pm 0.6) \%$	
$\Gamma_{57}$	$K_S^0 \pi^+ \pi^0 \text{ nonresonant}$	$(9 \pm 7) \times 10^{-3}$	
$\Gamma_{58}$	$K^- \pi^+ \pi^+ \pi^0$	[b] $(6.00 \pm 0.28) \%$	S=1.1
$\Gamma_{59}$	$\bar{K}^*(892)^0 \rho^+ \text{ total,}$ $\bar{K}^*(892)^0 \rightarrow K^- \pi^+$	$(1.3 \pm 0.8) \%$	

$\Gamma_{60}$	$\overline{K}_1(1400)^0 \pi^+$ , $\overline{K}_1(1400)^0 \rightarrow K^- \pi^+ \pi^0$	( 1.8 $\pm$ 0.7 ) %
$\Gamma_{61}$	$K^- \rho^+ \pi^+$ total	( 2.9 $\pm$ 1.0 ) %
$\Gamma_{62}$	$K^- \rho^+ \pi^+$ 3-body	( 1.0 $\pm$ 0.4 ) %
$\Gamma_{63}$	$\overline{K}^*(892)^0 \pi^+ \pi^0$ total, $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	( 4.2 $\pm$ 0.6 ) %
$\Gamma_{64}$	$\overline{K}^*(892)^0 \pi^+ \pi^0$ 3-body, $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	( 2.7 $\pm$ 0.8 ) %
$\Gamma_{65}$	$K^*(892)^- \pi^+ \pi^+$ 3-body, $K^*(892)^- \rightarrow K^- \pi^0$	( 6 $\pm$ 3 ) $\times 10^{-3}$
$\Gamma_{66}$	$K^- \pi^+ \pi^+ \pi^0$ nonresonant	[d] ( 1.1 $\pm$ 0.5 ) %
$\Gamma_{67}$	$K_S^0 \pi^+ \pi^+ \pi^-$	[b] ( 3.10 $\pm$ 0.22 ) %
$\Gamma_{68}$	$K_S^0 a_1(1260)^+$ , $a_1(1260)^+ \rightarrow \pi^+ \pi^+ \pi^-$	( 1.8 $\pm$ 0.3 ) %
$\Gamma_{69}$	$\overline{K}_1(1400)^0 \pi^+$ , $\overline{K}_1(1400)^0 \rightarrow K_S^0 \pi^+ \pi^-$	( 1.8 $\pm$ 0.7 ) %
$\Gamma_{70}$	$K^*(892)^- \pi^+ \pi^+$ 3-body, $K^*(892)^- \rightarrow K_S^0 \pi^-$	( 1.3 $\pm$ 0.6 ) %
$\Gamma_{71}$	$K_S^0 \rho^0 \pi^+$ total	( 1.86 $\pm$ 0.34 ) %
$\Gamma_{72}$	$K_S^0 \rho^0 \pi^+$ 3-body	( 2.2 $\pm$ 2.2 ) $\times 10^{-3}$
$\Gamma_{73}$	$K_S^0 \pi^+ \pi^+ \pi^-$ nonresonant	( 3.7 $\pm$ 1.9 ) $\times 10^{-3}$
$\Gamma_{74}$	$K^- 3\pi^+ \pi^-$	[b] ( 5.8 $\pm$ 0.6 ) $\times 10^{-3}$
$\Gamma_{75}$	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$ , $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	( 1.2 $\pm$ 0.4 ) $\times 10^{-3}$
$\Gamma_{76}$	$\overline{K}^*(892)^0 \rho^0 \pi^+$ , $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	( 2.3 $\pm$ 0.4 ) $\times 10^{-3}$
$\Gamma_{77}$	$\overline{K}^*(892)^0 \pi^+ \pi^+ \pi^-$ no- $\rho$ , $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	
$\Gamma_{78}$	$K^- \rho^0 \pi^+ \pi^+$	( 1.75 $\pm$ 0.29 ) $\times 10^{-3}$
$\Gamma_{79}$	$K^- 3\pi^+ \pi^-$ nonresonant	( 4.1 $\pm$ 3.0 ) $\times 10^{-4}$
$\Gamma_{80}$	$K^+ 2K_S^0$	( 4.6 $\pm$ 2.1 ) $\times 10^{-3}$
$\Gamma_{81}$	$K^+ K^- K_S^0 \pi^+$	( 2.4 $\pm$ 0.6 ) $\times 10^{-4}$

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

$\Gamma_{82}$	$K_S^0 a_1(1260)^+$	( 3.6 $\pm$ 0.6 ) %
$\Gamma_{83}$	$K_S^0 a_2(1320)^+$	< 1.5 $\times 10^{-3}$
$\Gamma_{84}$	$\overline{K}^*(892)^0 \rho^+$ total	[d] ( 2.0 $\pm$ 1.2 ) %
$\Gamma_{85}$	$\overline{K}^*(892)^0 \rho^+$ S-wave	[d] ( 1.5 $\pm$ 1.5 ) %
$\Gamma_{86}$	$\overline{K}^*(892)^0 \rho^+$ P-wave	< 1 $\times 10^{-3}$
$\Gamma_{87}$	$\overline{K}^*(892)^0 \rho^+$ D-wave	( 9 $\pm$ 6 ) $\times 10^{-3}$
$\Gamma_{88}$	$\overline{K}^*(892)^0 \rho^+$ D-wave longitudinal	< 7 $\times 10^{-3}$
$\Gamma_{89}$	$\overline{K}_1(1270)^0 \pi^+$	< 7 $\times 10^{-3}$

$\Gamma_{90}$	$\overline{K}_1(1400)^0 \pi^+$	( 5.4 $\pm$ 1.7 ) %
$\Gamma_{91}$	$\overline{K}^*(1410)^0 \pi^+$	
$\Gamma_{92}$	$\overline{K}^*(892)^0 \pi^+ \pi^0$ total	( 6.3 $\pm$ 0.9 ) %
$\Gamma_{93}$	$\overline{K}^*(892)^0 \pi^+ \pi^0$ 3-body	[d] ( 4.0 $\pm$ 1.2 ) %
$\Gamma_{94}$	$K^*(892)^- \pi^+ \pi^+$ total	—
$\Gamma_{95}$	$K^*(892)^- \pi^+ \pi^+$ 3-body	( 1.4 $\pm$ 0.9 ) %
$\Gamma_{96}$	$K_S^0 f_0(980) \pi^+$	
$\Gamma_{97}$	$\overline{K}^*(892)^0 a_1(1260)^+$	( 9.4 $\pm$ 1.9 ) $\times 10^{-3}$

### Pionic modes

$\Gamma_{98}$	$\pi^+ \pi^0$	( 1.28 $\pm$ 0.08 ) $\times 10^{-3}$
$\Gamma_{99}$	$\pi^+ \pi^+ \pi^-$	( 3.31 $\pm$ 0.21 ) $\times 10^{-3}$
$\Gamma_{100}$	$\rho^0 \pi^+$	( 1.07 $\pm$ 0.11 ) $\times 10^{-3}$
$\Gamma_{101}$	$\pi^+ (\pi^+ \pi^-)_{S\text{-wave}}$	( 1.85 $\pm$ 0.18 ) $\times 10^{-3}$
$\Gamma_{102}$	$\sigma \pi^+, \sigma \rightarrow \pi^+ \pi^-$	( 1.53 $\pm$ 0.32 ) $\times 10^{-3}$
$\Gamma_{103}$	$f_0(980) \pi^+,$ $f_0(980) \rightarrow \pi^+ \pi^-$	( 2.1 $\pm$ 0.5 ) $\times 10^{-4}$
$\Gamma_{104}$	$f_0(1370) \pi^+,$ $f_0(1370) \rightarrow \pi^+ \pi^-$	( 8 $\pm$ 6 ) $\times 10^{-5}$
$\Gamma_{105}$	$f_2(1270) \pi^+,$ $f_2(1270) \rightarrow \pi^+ \pi^-$	( 4.8 $\pm$ 1.3 ) $\times 10^{-4}$
$\Gamma_{106}$	$\rho(1450)^0 \pi^+,$ $\rho(1450)^0 \rightarrow \pi^+ \pi^-$	
$\Gamma_{107}$	$\pi^+ \pi^+ \pi^-$ nonresonant	
$\Gamma_{108}$	$\pi^+ 2\pi^0$	( 4.8 $\pm$ 0.4 ) $\times 10^{-3}$
$\Gamma_{109}$	$\pi^+ \pi^+ \pi^- \pi^0$	( 1.18 $\pm$ 0.09 ) %
$\Gamma_{110}$	$\eta \pi^+, \eta \rightarrow \pi^+ \pi^- \pi^0$	( 7.9 $\pm$ 0.7 ) $\times 10^{-4}$
$\Gamma_{111}$	$\omega \pi^+, \omega \rightarrow \pi^+ \pi^- \pi^0$	< 3 $\times 10^{-4}$ CL=90%
$\Gamma_{112}$	$3\pi^+ 2\pi^-$	( 1.68 $\pm$ 0.17 ) $\times 10^{-3}$ S=1.1
$\Gamma_{113}$	$3\pi^+ 2\pi^- \pi^0$	

Fractions of some of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

$\Gamma_{114}$	$\eta \pi^+$	( 3.50 $\pm$ 0.32 ) $\times 10^{-3}$
$\Gamma_{115}$	$\omega \pi^+$	< 3.4 $\times 10^{-4}$ CL=90%
$\Gamma_{116}$	$\eta \rho^+$	< 7 $\times 10^{-3}$ CL=90%
$\Gamma_{117}$	$\eta'(958) \pi^+$	( 5.3 $\pm$ 1.1 ) $\times 10^{-3}$
$\Gamma_{118}$	$\eta'(958) \rho^+$	< 6 $\times 10^{-3}$ CL=90%

### Hadronic modes with a $K\bar{K}$ pair

$\Gamma_{119}$	$K^+ K_S^0$	( 2.95 $\pm$ 0.19 ) $\times 10^{-3}$ S=1.1
$\Gamma_{120}$	$K^+ K^- \pi^+$	[b] ( 1.00 $\pm$ 0.04 ) % S=1.2
$\Gamma_{121}$	$\phi \pi^+, \phi \rightarrow K^+ K^-$	( 3.2 $\pm$ 0.4 ) $\times 10^{-3}$
$\Gamma_{122}$	$K^+ \overline{K}^*(892)^0,$ $\overline{K}^*(892)^0 \rightarrow K^- \pi^+$	( 3.01 $\pm$ 0.35 ) $\times 10^{-3}$

$\Gamma_{123}$	$K^+ \bar{K}_0^*(1430)^0, \bar{K}_0^*(1430)^0 \rightarrow$	$(3.7 \pm 0.4) \times 10^{-3}$	
$\Gamma_{124}$	$K^- \pi^+$ $K^+ K^- \pi^+$ nonresonant	—	
$\Gamma_{125}$	$K_S^0 K_S^0 \pi^+$	—	
$\Gamma_{126}$	$K^*(892)^+ K_S^0,$ $K^*(892)^+ \rightarrow K_S^0 \pi^+$	$(5.3 \pm 2.3) \times 10^{-3}$	
$\Gamma_{127}$	$K^+ K^- \pi^+ \pi^0$	—	
$\Gamma_{128}$	$\phi \pi^+ \pi^0, \phi \rightarrow K^+ K^-$	$(1.1 \pm 0.5) \%$	
$\Gamma_{129}$	$\phi \rho^+, \phi \rightarrow K^+ K^-$	$< 7 \times 10^{-3}$	CL=90%
$\Gamma_{130}$	$K^+ K^- \pi^+ \pi^0$ non- $\phi$	$(1.5 \pm 0.7) \%$	
$\Gamma_{131}$	$K^+ K_S^0 \pi^+ \pi^-$	$(1.74 \pm 0.21) \times 10^{-3}$	
$\Gamma_{132}$	$K_S^0 K^- \pi^+ \pi^+$	$(2.38 \pm 0.23) \times 10^{-3}$	
$\Gamma_{133}$	$K^*(892)^+ \bar{K}^*(892)^0,$ $K^{*+} \rightarrow K_S^0 \pi^+, \bar{K}^{*0} \rightarrow K^- \pi^+$	$(5.8 \pm 2.4) \times 10^{-3}$	
$\Gamma_{134}$	$K_S^0 K^- \pi^+ \pi^+ (\text{non-}K^{*+} \bar{K}^{*0})$	$< 4 \times 10^{-3}$	CL=90%
$\Gamma_{135}$	$K^+ K^- \pi^+ \pi^+ \pi^-$	$(2.3 \pm 1.2) \times 10^{-4}$	

Fractions of the following modes with resonances have already appeared above as submodes of particular charged-particle modes.

$\Gamma_{136}$	$\phi \pi^+$	$(6.5 \pm 0.7) \times 10^{-3}$	
$\Gamma_{137}$	$\phi \pi^+ \pi^0$	$(2.3 \pm 1.0) \%$	
$\Gamma_{138}$	$\phi \rho^+$	$< 1.5 \%$	CL=90%
$\Gamma_{139}$	$K^+ \bar{K}^*(892)^0$		
$\Gamma_{140}$	$K^*(892)^+ K_S^0$	$(1.6 \pm 0.7) \%$	
$\Gamma_{141}$	$K^*(892)^+ \bar{K}^*(892)^0$	$(2.6 \pm 1.1) \%$	

### Doubly Cabibbo-suppressed modes

$\Gamma_{142}$	$K^+ \pi^0$	$(2.37 \pm 0.32) \times 10^{-4}$	
$\Gamma_{143}$	$K^+ \pi^+ \pi^-$	$(6.4 \pm 0.8) \times 10^{-4}$	
$\Gamma_{144}$	$K^+ \rho^0$	$(2.5 \pm 0.7) \times 10^{-4}$	
$\Gamma_{145}$	$K^*(892)^0 \pi^+, K^*(892)^0 \rightarrow$ $K^+ \pi^-$	$(3.0 \pm 0.6) \times 10^{-4}$	
$\Gamma_{146}$	$K^+ f_0(980), f_0(980) \rightarrow$ $\pi^+ \pi^-$	$(5.7 \pm 3.5) \times 10^{-5}$	
$\Gamma_{147}$	$K_2^*(1430)^0 \pi^+, K_2^*(1430)^0 \rightarrow$ $K^+ \pi^-$	$(5.2 \pm 3.5) \times 10^{-5}$	
$\Gamma_{148}$	$K^+ \pi^+ \pi^-$ nonresonant		
$\Gamma_{149}$	$K^+ K^+ K^-$	$(9.0 \pm 2.1) \times 10^{-5}$	
$\Gamma_{150}$	$\phi K^+$		

**$\Delta C = 1$  weak neutral current ( $C1$ ) modes, or  
Lepton Family number ( $LF$ ) or Lepton number ( $L$ ) violating modes**

$\Gamma_{151}$	$\pi^+ e^+ e^-$	$C1$	$< 7.4$	$\times 10^{-6}$	CL=90%
$\Gamma_{152}$	$\pi^+ \phi, \phi \rightarrow e^+ e^-$	[e]	( 2.7 $\pm$ 3.6 )	$\times 10^{-6}$	
$\Gamma_{153}$	$\pi^+ \mu^+ \mu^-$	$C1$	$< 8.8$	$\times 10^{-6}$	CL=90%
$\Gamma_{154}$	$\rho^+ \mu^+ \mu^-$	$C1$	$< 5.6$	$\times 10^{-4}$	CL=90%
$\Gamma_{155}$	$K^+ e^+ e^-$	[f]	$< 6.2$	$\times 10^{-6}$	CL=90%
$\Gamma_{156}$	$K^+ \mu^+ \mu^-$	[f]	$< 9.2$	$\times 10^{-6}$	CL=90%
$\Gamma_{157}$	$\pi^+ e^\pm \mu^\mp$	$LF$	[g] $< 3.4$	$\times 10^{-5}$	CL=90%
$\Gamma_{158}$	$\pi^+ e^+ \mu^-$				
$\Gamma_{159}$	$\pi^+ e^- \mu^+$				
$\Gamma_{160}$	$K^+ e^\pm \mu^\mp$	$LF$	[g] $< 6.8$	$\times 10^{-5}$	CL=90%
$\Gamma_{161}$	$K^+ e^+ \mu^-$				
$\Gamma_{162}$	$K^+ e^- \mu^+$				
$\Gamma_{163}$	$\pi^- e^+ e^+$	$L$	$< 3.6$	$\times 10^{-6}$	CL=90%
$\Gamma_{164}$	$\pi^- \mu^+ \mu^+$	$L$	$< 4.8$	$\times 10^{-6}$	CL=90%
$\Gamma_{165}$	$\pi^- e^+ \mu^+$	$L$	$< 5.0$	$\times 10^{-5}$	CL=90%
$\Gamma_{166}$	$\rho^- \mu^+ \mu^+$	$L$	$< 5.6$	$\times 10^{-4}$	CL=90%
$\Gamma_{167}$	$K^- e^+ e^+$	$L$	$< 4.5$	$\times 10^{-6}$	CL=90%
$\Gamma_{168}$	$K^- \mu^+ \mu^+$	$L$	$< 1.3$	$\times 10^{-5}$	CL=90%
$\Gamma_{169}$	$K^- e^+ \mu^+$	$L$	$< 1.3$	$\times 10^{-4}$	CL=90%
$\Gamma_{170}$	$K^*(892)^- \mu^+ \mu^+$	$L$	$< 8.5$	$\times 10^{-4}$	CL=90%

$\Gamma_{171}$  A dummy mode used by the fit. (36.0  $\pm$  2.2 ) % S=1.1

- [a] An  $\ell$  indicates an  $e$  or a  $\mu$  mode, not a sum over these modes.
- [b] The branching fraction for this mode may differ from the sum of the submodes that contribute to it, due to interference effects. See the relevant papers.
- [c] These subfractions of the  $K^- \pi^+ \pi^+$  mode are uncertain: see the Particle Listings.
- [d] The two experiments measuring this fraction are in serious disagreement. See the Particle Listings.
- [e] This is *not* a test for the  $\Delta C=1$  weak neutral current, but leads to the  $\pi^+ e^+ e^-$  final state.
- [f] This mode is not a useful test for a  $\Delta C=1$  weak neutral current because both quarks must change flavor in this decay.
- [g] The value is for the sum of the charge states or particle/antiparticle states indicated.

## CONSTRAINED FIT INFORMATION

An overall fit to 30 branching ratios uses 51 measurements and one constraint to determine 19 parameters. The overall fit has a  $\chi^2 = 30.6$  for 33 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients  $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$ , in percent, from the fit to the branching fractions,  $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$ . The fit constrains the  $x_i$  whose labels appear in this array to sum to one.

$x_{19}$	3										
$x_{20}$	0	0									
$x_{31}$	0	0	0								
$x_{38}$	1	4	8	5							
$x_{39}$	3	61	0	0	4						
$x_{45}$	9	34	1	0	9	34					
$x_{46}$	8	40	1	1	11	40	84				
$x_{54}$	4	15	0	0	4	15	47	38			
$x_{58}$	5	26	1	0	7	27	56	66	33		
$x_{67}$	6	25	1	0	6	25	67	61	60	41	
$x_{74}$	3	15	0	0	4	15	31	37	14	25	
$x_{112}$	3	14	0	0	4	14	29	35	13	23	
$x_{114}$	3	16	0	0	4	16	33	39	14	26	
$x_{119}$	5	21	0	0	6	21	53	53	25	35	
$x_{120}$	6	33	1	0	9	33	68	82	23	59	
$x_{121}$	2	12	0	0	3	12	25	31	10	21	
$x_{136}$	2	12	0	0	3	12	25	30	10	21	
$x_{171}$	-28	-71	-27	-3	-24	-65	-68	-73	-52	-57	
	$x_{18}$	$x_{19}$	$x_{20}$	$x_{31}$	$x_{38}$	$x_{39}$	$x_{45}$	$x_{46}$	$x_{54}$	$x_{58}$	
$x_{74}$	23										
$x_{112}$	21	78									
$x_{114}$	24	15	13								
$x_{119}$	37	20	18	20							
$x_{120}$	46	31	28	35	43						
$x_{121}$	18	11	11	43	16	32					
$x_{136}$	18	11	11	43	16	32	99				
$x_{171}$	-60	-30	-28	-31	-41	-60	-27	-27			
	$x_{67}$	$x_{74}$	$x_{112}$	$x_{114}$	$x_{119}$	$x_{120}$	$x_{121}$	$x_{136}$			

## **D<sup>+</sup> BRANCHING RATIOS**

Some now-obsolete measurements have been omitted from these Listings.

### — c-quark decays —

#### **Γ(c → e<sup>+</sup> anything)/Γ(c → anything)**

For the Summary Table, we only use the average of e<sup>+</sup> and μ<sup>+</sup> measurements from Z<sup>0</sup> → c̄ decays; see the second data block below.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.103±0.009<sup>+0.009</sup><sub>-0.008</sub></b>	378	<sup>3</sup> ABBIENDI	99K OPAL	Z <sup>0</sup> → c̄

<sup>3</sup> ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed D\*(2010)<sup>+</sup> → D<sup>0</sup>π<sup>+</sup> decays in Z<sup>0</sup> → c̄.

#### **Γ(c → μ<sup>+</sup> anything)/Γ(c → anything)**

For the Summary Table, we only use the average of e<sup>+</sup> and μ<sup>+</sup> measurements from Z<sup>0</sup> → c̄ decays; see the next data block.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.082±0.005 OUR AVERAGE</b>				
0.073±0.008±0.002	73	KAYIS-TOPAK.05	CHRS	ν <sub>μ</sub> emulsion
0.095±0.007 <sup>+0.014</sup> <sub>-0.013</sub>	2829	ASTIER	00D NOMD	ν <sub>μ</sub> Fe → μ <sup>-</sup> μ <sup>+</sup> X
0.090±0.007 <sup>+0.007</sup> <sub>-0.006</sub>	476	<sup>4</sup> ABBIENDI	99K OPAL	Z <sup>0</sup> → c̄
0.086±0.017 <sup>+0.008</sup> <sub>-0.007</sub>	69	<sup>5</sup> ALBRECHT	92F ARG	e <sup>+</sup> e <sup>-</sup> ≈ 10 GeV
0.078±0.009±0.012		ONG	88 MRK2	e <sup>+</sup> e <sup>-</sup> 29 GeV
0.078±0.015±0.02		BARTEL	87 JADE	e <sup>+</sup> e <sup>-</sup> 34.6 GeV
0.082±0.012 <sup>+0.02</sup> <sub>-0.01</sub>		ALTHOFF	84G TASS	e <sup>+</sup> e <sup>-</sup> 34.5 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.093±0.009±0.009	88	KAYIS-TOPAK.02	CHRS	See KAYIS-TOPAKSU 05
0.089±0.018±0.025		BARTEL	85J JADE	See BARTEL 87

<sup>4</sup> ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed D\*(2010)<sup>+</sup> → D<sup>0</sup>π<sup>+</sup> decays in Z<sup>0</sup> → c̄.

<sup>5</sup> ALBRECHT 92F uses the excess of right-sign over wrong-sign leptons in a sample of events tagged by fully reconstructed D\*(2010)<sup>+</sup> → D<sup>0</sup>π<sup>+</sup> decays.

#### **Γ(c → ℓ<sup>+</sup> anything)/Γ(c → anything)**

This is an average (not a sum) of e<sup>+</sup> and μ<sup>+</sup> measurements.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.096 ±0.004 OUR AVERAGE</b>				
0.0958±0.0042±0.0028	1828	<sup>6</sup> ABREU	00O DLPH	Z <sup>0</sup> → c̄
0.095 ±0.006 <sup>+0.007</sup> <sub>-0.006</sub>	854	<sup>7</sup> ABBIENDI	99K OPAL	Z <sup>0</sup> → c̄

<sup>6</sup> ABREU 00O uses leptons opposite fully reconstructed D\*(2010)<sup>+</sup>, D<sup>+</sup>, or D<sup>0</sup> mesons.

<sup>7</sup> ABBIENDI 99K uses the excess of right-sign over wrong-sign leptons opposite reconstructed D\*(2010)<sup>+</sup> → D<sup>0</sup>π<sup>+</sup> decays in Z<sup>0</sup> → c̄.

### $\Gamma(c \rightarrow D^*(2010)^+ \text{anything})/\Gamma(c \rightarrow \text{anything})$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.255±0.015±0.008</b>	2371	8 ABREU	000 DLPH	$Z^0 \rightarrow c\bar{c}$

<sup>8</sup> ABREU 000 uses slow pions opposite fully reconstructed  $D^*(2010)^+$ ,  $D^+$ , or  $D^0$  mesons as a signal of  $D^*(2010)^-$  production.

### Inclusive modes

#### $\Gamma(e^+ \text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.1613±0.0020±0.0033</b>	$8798 \pm 105$	9 ADAM	06A CLEO	$e^+ e^-$ at $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.20 $\begin{array}{l} +0.09 \\ -0.07 \end{array}$		AGUILAR-...	87E HYBR	$\pi p, pp$ 360,400 GeV
0.170 $\pm 0.019$ $\pm 0.007$	158	BALTRUSAIT...	85B MRK3	$e^+ e^-$ 3.77 GeV
0.168 $\pm 0.064$	23	SCHINDLER	81 MRK2	$e^+ e^-$ 3.771 GeV
0.220 $\begin{array}{l} +0.044 \\ -0.022 \end{array}$		BACINO	80 DLCO	$e^+ e^-$ 3.77 GeV

<sup>9</sup> Using the  $D^+$  and  $D^0$  lifetimes, ADAM 06A finds that the ratio of the  $D^+$  and  $D^0$  inclusive  $e^+$  widths is  $0.985 \pm 0.028 \pm 0.015$ , consistent with the isospin-invariance prediction of 1.

#### $\Gamma(K^- \text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.275±0.024 OUR AVERAGE</b>				

0.278 $\begin{array}{l} +0.036 \\ -0.031 \end{array}$		BARLAG	92C ACCM	$\pi^-$ Cu 230 GeV
0.271 $\pm 0.023 \pm 0.024$		COFFMAN	91 MRK3	$e^+ e^-$ 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 $\pm 0.07$		AGUILAR-...	87E HYBR	$\pi p, pp$ 360, 400 GeV
0.16 $\begin{array}{l} +0.08 \\ -0.07 \end{array}$		AGUILAR-...	86B HYBR	See AGUILAR-BENITEZ 87E
0.19 $\pm 0.05$	26	SCHINDLER	81 MRK2	$e^+ e^-$ 3.771 GeV
0.10 $\pm 0.07$	3	VUILLEMIN	78 MRK1	$e^+ e^-$ 3.772 GeV

#### $[\Gamma(\bar{K}^0 \text{anything}) + \Gamma(K^0 \text{anything})]/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.61 ± 0.05 OUR AVERAGE</b>				

0.605 $\pm 0.055 \pm 0.033$	$244 \pm 22$	ABLIKIM	06U BES2	$e^+ e^-$ at 3773 MeV
0.612 $\pm 0.065 \pm 0.043$		COFFMAN	91 MRK3	$e^+ e^-$ 3.77 GeV

#### $\Gamma(K^+ \text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.055±0.013±0.009</b>		COFFMAN	91 MRK3	$e^+ e^-$ 3.77 GeV

#### $\Gamma(K^*(892)^- \text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.057±0.052±0.007</b>	$7.2 \pm 6.5$	ABLIKIM	06U BES2	$e^+ e^-$ at 3773 MeV

$\Gamma(K^*(892)^0 \text{anything})/\Gamma_{\text{total}}$

VALUE	EVTS
<b>0.232 ± 0.045 ± 0.030</b>	189 ± 36

DOCUMENT ID	TECN	COMMENT
ABLIKIM	05P BES	$e^+ e^- \approx 3773 \text{ MeV}$

$\Gamma_7/\Gamma$

$\Gamma(K^*(892)^+ \text{anything})/\Gamma_{\text{total}}$

VALUE	CL%
<b>&lt;0.203</b>	90

DOCUMENT ID	TECN	COMMENT
ABLIKIM	06U BES2	$e^+ e^- \text{ at } 3773 \text{ MeV}$

$\Gamma_8/\Gamma$

$\Gamma(K^*(892)^0 \text{anything})/\Gamma_{\text{total}}$

VALUE	CL%
<b>&lt;0.066</b>	90

DOCUMENT ID	TECN	COMMENT
ABLIKIM	05P BES	$e^+ e^- \approx 3773 \text{ MeV}$

$\Gamma_9/\Gamma$

$\Gamma(\eta \text{ anything})/\Gamma_{\text{total}}$

This ratio includes  $\eta$  particles from  $\eta'$  decays.

VALUE (units $10^{-2}$ )	EVTS
<b>6.3 ± 0.5 ± 0.5</b>	1972 ± 142

DOCUMENT ID	TECN	COMMENT
HUANG	06B CLEO	$e^+ e^- \text{ at } \psi(3770)$

$\Gamma_{10}/\Gamma$

$\Gamma(\eta' \text{ anything})/\Gamma_{\text{total}}$

VALUE (units $10^{-2}$ )	EVTS
<b>1.04 ± 0.16 ± 0.09</b>	82 ± 13

DOCUMENT ID	TECN	COMMENT
HUANG	06B CLEO	$e^+ e^- \text{ at } \psi(3770)$

$\Gamma_{11}/\Gamma$

$\Gamma(\phi \text{ anything})/\Gamma_{\text{total}}$

VALUE (units $10^{-2}$ )	CL%	EVTS
<b>1.03 ± 0.10 ± 0.07</b>	248 ± 21	

DOCUMENT ID	TECN	COMMENT
HUANG	06B CLEO	$e^+ e^- \text{ at } \psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.8	90	BAI	00C BES	$e^+ e^- \rightarrow D\bar{D}^*, D^*\bar{D}^*$
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$\Gamma_{12}/\Gamma$

$\Gamma(\phi e^+ \text{ anything})/\Gamma_{\text{total}}$

VALUE	CL%
<b>&lt;0.016</b>	90

DOCUMENT ID	TECN	COMMENT
BAI	00C BES	$e^+ e^- \rightarrow D\bar{D}^*, D^*\bar{D}^*$

$\Gamma_{13}/\Gamma$

• • •	We do not use the following data for averages, fits, limits, etc. • • •
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<0.016	90	BAI	00C BES	$e^+ e^- \rightarrow D\bar{D}^*, D^*\bar{D}^*$
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— Leptonic and semileptonic modes —

$\Gamma(e^+ \nu_e)/\Gamma_{\text{total}}$

VALUE	CL%
<b>&lt;2.4 × 10<sup>-5</sup></b>	90

DOCUMENT ID	TECN	COMMENT
ARTUSO	05A CLEO	$e^+ e^- \text{ at } \psi(3770)$

$\Gamma_{14}/\Gamma$

$\Gamma(\mu^+ \nu_\mu)/\Gamma_{\text{total}}$

See the “Note on Pseudoscalar-Meson Decay Constants” in the Listings for the  $\pi^\pm$ .

VALUE (units $10^{-4}$ )	EVTS
<b>4.40 ± 0.66<sup>+0.09</sup><sub>-0.12</sub></b>	47 ± 7

DOCUMENT ID	TECN	COMMENT
ARTUSO	05A CLEO	$e^+ e^- \text{ at } \psi(3770)$

$\Gamma_{15}/\Gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

12.2	<sup>+11.1</sup> <sub>-5.3</sub>	±1.0	3
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11 ABLIKIM	05D BES	$e^+ e^- \approx 3.773 \text{ GeV}$
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3.5	± 1.4	± 0.6	7
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12 BONVICINI	04A CLEO	Incl. in ARTUSO 05A
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8	<sup>+16</sup> <sub>-5</sub>	<sup>+5</sup> <sub>-2</sub>	1
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13 BAI	98B BES	$e^+ e^- \rightarrow D^+ D^-$
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<sup>10</sup> ARTUSO 05A obtains  $f_{D^+} = 222.6 \pm 16.7^{+2.8}_{-3.4}$  MeV from this measurement.

<sup>11</sup> ABLIKIM 05D finds a background-subtracted  $2.67 \pm 1.74$   $D^+ \rightarrow \mu^+ \nu_\mu$  events, and from this obtains  $f_{D^+} = 371^{+129}_{-119} \pm 25$  MeV.

<sup>12</sup> BONVICINI 04A finds eight events with an estimated background of one, and from the branching fraction obtains  $f_{D^+} = 202 \pm 41 \pm 17$  MeV.

<sup>13</sup> BAI 98B obtains  $f_{D^+} = (300^{+180+80}_{-150-40})$  MeV from this measurement.

### $\Gamma(\tau^+ \nu_\tau)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{16}/\Gamma$
$<2.1 \times 10^{-3}$	90	RUBIN	06A	CLEO $e^+ e^-$ at $\psi(3770)$	

### $\Gamma(\bar{K}^0 e^+ \nu_e)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{18}/\Gamma$
<b>0.086 ± 0.005 OUR FIT</b>					
<b>0.087 ± 0.005 OUR AVERAGE</b>					

<sup>14</sup> ABLIKIM 05A  $\Gamma(D^0 \rightarrow K^- e^+ \nu_e)$  branching fraction of ABLIKIM 04C and Particle Data Group lifetimes gives  $\Gamma(D^0 \rightarrow K^- e^+ \nu_e) / \Gamma(D^+ \rightarrow \bar{K}^0 e^+ \nu_e) = 1.08 \pm 0.22 \pm 0.07$ ; isospin invariance predicts the ratio is 1.0.

<sup>15</sup> HUANG 05B finds  $\Gamma(D^0 \rightarrow K^- e^+ \nu_e) / \Gamma(D^+ \rightarrow \bar{K}^0 e^+ \nu_e) = 1.00 \pm 0.05 \pm 0.04$ ; isospin invariance predicts the ratio is 1.0.

### $\Gamma(\bar{K}^0 e^+ \nu_e)/\Gamma(K_S^0 \pi^+)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{18}/\Gamma_{45}$
<b>5.8 ± 0.4 OUR FIT</b>					
<b>5.20 ± 0.70 ± 0.52</b>	186	16 BEAN	93C	CLE2 $e^+ e^- \approx \gamma(4S)$	

<sup>16</sup> BEAN 93C uses  $\bar{K}^0 \mu^+ \nu_\mu$  as well as  $\bar{K}^0 e^+ \nu_e$  events and makes a small phase-space adjustment to the number of the  $\mu^+$  events to use them as  $e^+$  events. The value given is twice that in BEAN 93C because we are using  $K_S^0 \pi^+$  and not  $\bar{K}^0 \pi^+$ , in the denominator.

### $\Gamma(\bar{K}^0 e^+ \nu_e)/\Gamma(K^- \pi^+ \pi^+)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{18}/\Gamma_{46}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.66 \pm 0.09 \pm 0.14$		ANJOS	91C	E691 $\gamma$ Be 80–240 GeV	

### $\Gamma(\bar{K}^0 \mu^+ \nu_\mu)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{19}/\Gamma$
<b>0.096 ± 0.008 OUR FIT</b>		Error includes scale factor of 1.1.			
<b>0.103 ± 0.023 ± 0.008</b>	29 ± 6	ABLIKIM	07	BES2 $e^+ e^-$ at 3773 MeV	

### $\Gamma(\bar{K}^0 \mu^+ \nu_\mu)/\Gamma(K^- \pi^+ \pi^+)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{19}/\Gamma_{46}$
<b>1.00 ± 0.08 OUR FIT</b>		Error includes scale factor of 1.1.			
<b>1.019 ± 0.076 ± 0.065</b>	555 ± 39	LINK	04E	FOCS $\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV	

### $\Gamma(\bar{K}^0 \mu^+ \nu_\mu)/\Gamma(\mu^+ \text{anything})$

$\Gamma_{19}/\Gamma_2$

VALUE	EVTS	DOCUMENT ID	COMMENT
<b>• • •</b> We do not use the following data for averages, fits, limits, etc. <b>• • •</b>			
$0.76 \pm 0.06$	84	<sup>17</sup> AOKI	$\pi^-$ emulsion
<sup>17</sup> From topological branching ratios in emulsion with an identified muon.			

### $\Gamma(K^- \pi^+ e^+ \nu_e)/\Gamma_{\text{total}}$

$\Gamma_{20}/\Gamma$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>4.1 ± 0.6 OUR FIT</b> Error includes scale factor of 1.1.				

### **3.5 $^{+0.7}_{-0.6}$ OUR AVERAGE**

$3.50 \pm 0.75 \pm 0.27$	$29 \pm 6$	ABLIKIM	060 BES2	$e^+ e^-$ at 3773 MeV
$3.5 \pm 1.2 \pm 0.4$	14	<sup>18</sup> BAI	91 MRK3	$e^+ e^- \approx 3.77$ GeV

<sup>18</sup> BAI 91 finds that a fraction  $0.79^{+0.15}_{-0.17} {}^{+0.09}_{-0.03}$  of combined  $D^+$  and  $D^0$  decays to  $\bar{K}\pi e^+ \nu_e$  (24 events) are  $\bar{K}^*(892) e^+ \nu_e$ .

### $\Gamma(\bar{K}^*(892)^0 e^+ \nu_e)/\Gamma_{\text{total}}$

$\Gamma_{38}/\Gamma$

Unseen decay modes of  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
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**5.56 ± 0.32 OUR FIT** Error includes scale factor of 1.2.

### **5.52 ± 0.34 OUR AVERAGE**

$5.06 \pm 1.21 \pm 0.40$	$28 \pm 7$	ABLIKIM	060 BES2	$e^+ e^-$ at 3773 MeV
$5.56 \pm 0.27 \pm 0.23$	$422 \pm 21$	<sup>19</sup> HUANG	05B CLEO	$e^+ e^-$ at $\psi(3770)$
<sup>19</sup> HUANG 05B finds $\Gamma(D^0 \rightarrow K^{*-} e^+ \nu_e) / \Gamma(D^+ \rightarrow \bar{K}^{*0} e^+ \nu_e) = 0.98 \pm 0.08 \pm 0.04$ ; isospin invariance predicts the ratio is 1.0.				

### $\Gamma(\bar{K}^*(892)^0 e^+ \nu_e)/\Gamma(K^- \pi^+ e^+ \nu_e)$

$\Gamma_{38}/\Gamma_{20}$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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**1.37 ± 0.22 OUR FIT** Error includes scale factor of 1.2.

**1.0 ± 0.3** 35 ADAMOVICH 91 OMEG  $\pi^-$  340 GeV

### $\Gamma(\bar{K}^*(892)^0 e^+ \nu_e)/\Gamma(K^- \pi^+ \pi^+)$

$\Gamma_{38}/\Gamma_{46}$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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**0.58 ± 0.04 OUR FIT** Error includes scale factor of 1.3.

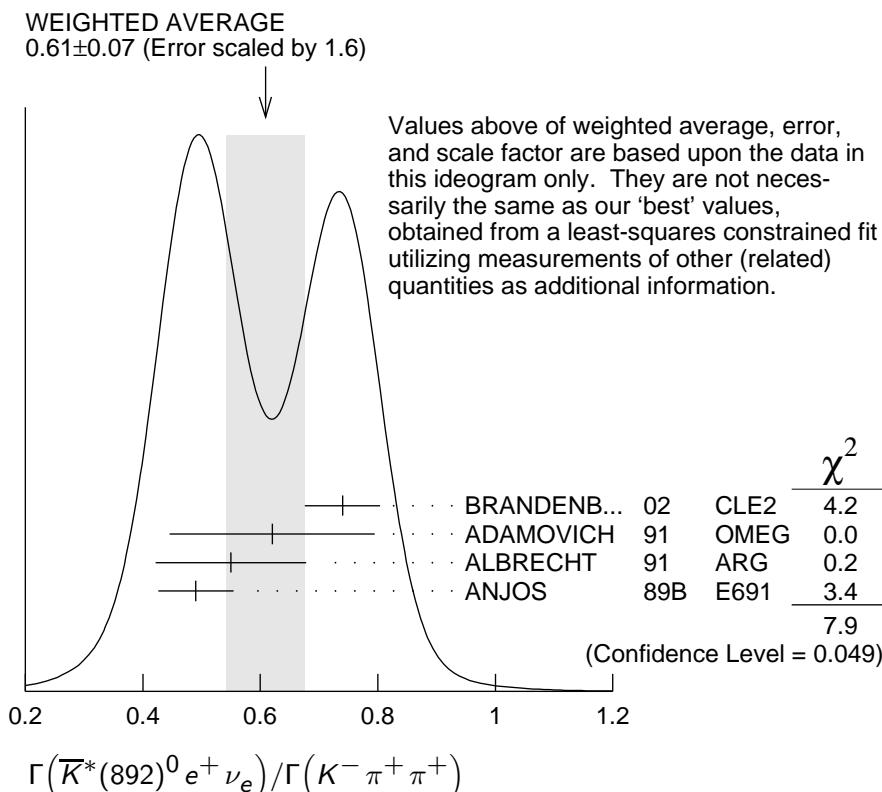
**0.61 ± 0.07 OUR AVERAGE** Error includes scale factor of 1.6. See the ideogram below.

$0.74 \pm 0.04 \pm 0.05$		BRANDENB... 02	CLE2	$e^+ e^- \approx \gamma(4S)$
$0.62 \pm 0.15 \pm 0.09$	35	ADAMOVICH 91	OMEG	$\pi^-$ 340 GeV
$0.55 \pm 0.08 \pm 0.10$	880	ALBRECHT 91	ARG	$e^+ e^- \approx 10.4$ GeV
$0.49 \pm 0.04 \pm 0.05$		ANJOS 89B	E691	Photoproduction

**• • •** We do not use the following data for averages, fits, limits, etc. **• • •**

$0.67 \pm 0.09 \pm 0.07$	710	<sup>20</sup> BEAN	93C CLE2	See BRANDEN-BURG 02
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20 BEAN 93C uses  $\bar{K}^*(892)^0 \mu^+ \nu_\mu$  as well as  $\bar{K}^*(892)^0 e^+ \nu_e$  events and makes a small phase-space adjustment to the number of the  $\mu^+$  events to use them as  $e^+$  events.



### $\Gamma(K^- \pi^+ e^+ \nu_e \text{ nonresonant}) / \Gamma_{\text{total}}$

### $\Gamma_{22}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.007	90	21 ANJOS	89B E691	Photoproduction

21 ANJOS 89B assumes a  $\Gamma(D^+ \rightarrow K^- \pi^+ \pi^+)/\Gamma_{\text{total}} = 9.1 \pm 1.3 \pm 0.4\%$ .

### $\Gamma(K^- \pi^+ \mu^+ \nu_\mu) / \Gamma(\bar{K}^0 \mu^+ \nu_\mu)$

### $\Gamma_{23}/\Gamma_{19}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.417±0.030±0.023	555 ± 39	LINK	04E FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

### $\Gamma(\bar{K}^*(892)^0 \mu^+ \nu_\mu) / \Gamma_{\text{total}}$

### $\Gamma_{39}/\Gamma$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				

0.0325±0.0071±0.0075 222 KODAMA 92C E653  $\pi^-$  emulsion 600 GeV

22 KODAMA 92C measures  $\Gamma(D^+ \rightarrow \bar{K}^*(892)^0 \mu^+ \nu_\mu) / \Gamma(D^0 \rightarrow K^- \mu^+ \nu_\mu) = 0.43 \pm 0.09 \pm 0.09$  and then uses  $\Gamma(D^0 \rightarrow K^- \mu^+ \nu_\mu) = (7.0 \pm 0.7) \times 10^{10} \text{ s}^{-1}$  to get the quoted branching fraction. See also the footnote to KODAMA 92C in the second data block below.

$\Gamma(\bar{K}^*(892)^0 \mu^+ \nu_\mu) / \Gamma(\bar{K}^0 \mu^+ \nu_\mu)$  $\Gamma_{39}/\Gamma_{19}$ 

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.58 ± 0.05 OUR FIT</b>				
<b>0.594 ± 0.043 ± 0.033</b>	555 ± 39	LINK	04E	FOCS $\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

 $\Gamma(\bar{K}^*(892)^0 \mu^+ \nu_\mu) / \Gamma(K^- \pi^+ \pi^+)$  $\Gamma_{39}/\Gamma_{46}$ 

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. See the end of the  $D^+$  Listings for measurements of  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$  form-factor ratios.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.58 ± 0.05 OUR FIT</b>				Error includes scale factor of 1.1.
<b>0.57 ± 0.06 OUR AVERAGE</b>				Error includes scale factor of 1.2.
0.72 ± 0.10 ± 0.05		BRANDENB... 02	CLE2	$e^+ e^- \approx \gamma(4S)$
0.56 ± 0.04 ± 0.06	875	FRABETTI 93E	E687	$\gamma$ Be $\bar{E}_\gamma \approx 200$ GeV
0.46 ± 0.07 ± 0.08	224	23 KODAMA	92C	E653 $\pi^-$ emulsion 600 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.602 ± 0.010 ± 0.021	12k	24 LINK	02J	FOCS $\gamma$ nucleus, $\approx 180$ GeV

<sup>23</sup> KODAMA 92C also uses the same  $\bar{K}^*0 \mu^+ \nu_\mu$  events normalizing instead with  $D^0 \rightarrow K^- \mu^+ \nu_\mu$  events, as reported in the second data block above.

<sup>24</sup> This LINK 02J result includes the effects of an interference of a small  $S$ -wave  $K^- \pi^+$  amplitude with the dominant  $\bar{K}^*0$  amplitude. (The interference effect is reported in LINK 02E.) This result is redundant with results of LINK 04E elsewhere in these Listings.

 $\Gamma(K^- \pi^+ \mu^+ \nu_\mu \text{ nonresonant}) / \Gamma(K^- \pi^+ \mu^+ \nu_\mu)$  $\Gamma_{25}/\Gamma_{23}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0530 ± 0.0074 ± 0.0099</b>	14k	LINK	05I	FOCS $\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.083 ± 0.029		FRABETTI 93E	E687	< 0.12 (90% CL)

 $\Gamma(\pi^0 e^+ \nu_e) / \Gamma_{\text{total}}$  $\Gamma_{29}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0044 ± 0.0006 ± 0.0003</b>	63 ± 9	25 HUANG	05B CLEO	$e^+ e^-$ at $\psi(3770)$
25 HUANG 05B finds $\Gamma(D^0 \rightarrow \pi^- e^+ \nu_e) / 2 \Gamma(D^+ \rightarrow \pi^0 e^+ \nu_e) = 0.75^{+0.14}_{-0.11} \pm 0.04$ ; isospin invariance predicts the ratio is 1.0.				

 $\Gamma(\pi^0 \ell^+ \nu_\ell) / \Gamma(\bar{K}^0 \ell^+ \nu_\ell)$  $\Gamma_{30}/\Gamma_{17}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.046 ± 0.014 ± 0.017</b>	100	26 BARTELTT	97 CLE2	$e^+ e^- \approx \gamma(4S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.085 ± 0.027 ± 0.014      53      27 ALAM      93      CLE2      See BARTELTT 97

<sup>26</sup> BARTELTT 97 thus directly measures the product of ratios squared of CKM matrix elements and form factors at  $q^2=0$ :  $|V_{cd}/V_{cs}|^2 \cdot |f_+^\pi(0)/f_+^K(0)|^2 = 0.046 \pm 0.014 \pm 0.017$ .

<sup>27</sup> ALAM 93 thus directly measures the product of ratios squared of CKM matrix elements and form factors at  $q^2=0$ :  $|V_{cd}/V_{cs}|^2 \cdot |f_+^\pi(0)/f_+^K(0)|^2 = 0.085 \pm 0.027 \pm 0.014$ .

$\Gamma(\rho^0 e^+ \nu_e)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{31}/\Gamma$
<b>0.0022±0.0004 OUR FIT</b>					
<b>0.0021±0.0004±0.0001</b>	$27 \pm 6$	$^{28}$ HUANG	05B CLEO	$e^+ e^-$ at $\psi(3770)$	

28 HUANG 05B finds  $\Gamma(D^0 \rightarrow \rho^- e^+ \nu_e) / 2 \Gamma(D^+ \rightarrow \rho^0 e^+ \nu_e) = 1.2^{+0.4}_{-0.3} \pm 0.1$ ; isospin invariance predicts the ratio is 1.0.

$\Gamma(\rho^0 e^+ \nu_e)/\Gamma(\bar{K}^*(892)^0 e^+ \nu_e)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{31}/\Gamma_{38}$
<b>0.039±0.007 OUR FIT</b>					
<b>0.045±0.014±0.009</b>	49	$^{29}$ AITALA	97 E791	$\pi^-$ nucleus, 500 GeV	

29 AITALA 97 explicitly subtracts  $D^+ \rightarrow \eta' e^+ \nu_e$  and other backgrounds to get this result.

$\Gamma(\rho^0 \mu^+ \nu_\mu)/\Gamma(\bar{K}^*(892)^0 \mu^+ \nu_\mu)$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{32}/\Gamma_{39}$
<b>0.045±0.007 OUR AVERAGE</b>		Error includes scale factor of 1.1.			
0.041±0.006±0.004	$320 \pm 44$	LINK	06B FOCS	$\gamma$ A, $\bar{E}_\gamma \approx 180$ GeV	
0.051±0.015±0.009	54	$^{30}$ AITALA	97 E791	$\pi^-$ nucleus, 500 GeV	
0.079±0.019±0.013	39	$^{31}$ FRABETTI	97 E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV	

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.044 <sup>+0.031</sup> <sub>-0.025</sub> ±0.014	4	$^{32}$ KODAMA	93C E653	$\pi^-$ emulsion 600 GeV
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30 AITALA 97 explicitly subtracts  $D^+ \rightarrow \eta' \mu^+ \nu_\mu$  and other backgrounds to get this result.

31 Because the reconstruction efficiency for photons is low, this FRABETTI 97 result also includes any  $D^+ \rightarrow \eta' \mu^+ \nu_\mu \rightarrow \gamma \rho^0 \mu^+ \nu_\mu$  events in the numerator.

32 This KODAMA 93C result is based on a final signal of  $4.0^{+2.8}_{-2.3} \pm 1.3$  events; the estimates of backgrounds that affect this number are somewhat model dependent.

$\Gamma(\omega e^+ \nu_e)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	$\Gamma_{33}/\Gamma$
<b>0.0016<sup>+0.0007</sup><sub>-0.0006</sub>±0.0001</b>	$7.6^{+3.3}_{-2.7}$	HUANG	05B CLEO	$e^+ e^-$ at $\psi(3770)$	

$\Gamma(\phi e^+ \nu_e)/\Gamma_{\text{total}}$

Unseen decay modes of the  $\phi$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{34}/\Gamma$
<b>&lt;0.0201</b>	90	ABLIKIM	06P BES2	$e^+ e^-$ at 3773 MeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •					

<0.0209 90 BAI 91 MRK3  $e^+ e^- \approx 3.77$  GeV

$\Gamma(\phi \mu^+ \nu_\mu)/\Gamma_{\text{total}}$

Unseen decay modes of the  $\phi$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT	$\Gamma_{35}/\Gamma$
<b>&lt;0.0204</b>	90	ABLIKIM	06P BES2	$e^+ e^-$ at 3773 MeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •					

<0.0372 90 BAI 91 MRK3  $e^+ e^- \approx 3.77$  GeV

$$\Gamma(\eta\ell^+\nu_\ell)/\Gamma(\pi^0\ell^+\nu_\ell) \quad \Gamma_{36}/\Gamma_{30}$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.5	90	BARTEL	97	CLE2 $e^+e^- \approx \gamma(4S)$

$$\Gamma(\eta'(958)\mu^+\nu_\mu)/\Gamma(\bar{K}^*(892)^0\mu^+\nu_\mu) \quad \Gamma_{37}/\Gamma_{39}$$

Decay modes of the  $\eta'(958)$  not included in the search are corrected for.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.20	90	KODAMA	93B	E653 $\pi^-$ emulsion 600 GeV

$$\Gamma((\bar{K}^*(892)\pi)^0 e^+\nu_e)/\Gamma_{\text{total}} \quad \Gamma_{26}/\Gamma$$

Unseen decay modes of the  $\bar{K}^*(892)$  are included.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.012	90	ANJOS	92	E691 Photoproduction

$$\Gamma((\bar{K}\pi\pi)^0 e^+\nu_e \text{non-}\bar{K}^*(892))/\Gamma_{\text{total}} \quad \Gamma_{27}/\Gamma$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.009	90	ANJOS	92	E691 Photoproduction

$$\Gamma(K^-\pi^+\pi^0\mu^+\nu_\mu)/\Gamma(K^-\pi^+\mu^+\nu_\mu) \quad \Gamma_{28}/\Gamma_{23}$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.042	90	FRABETTI	93E	E687 $\gamma$ Be $\bar{E}_\gamma \approx 200$ GeV

$$\Gamma(\bar{K}_1(1270)^0\mu^+\nu_\mu)/\Gamma(\bar{K}^*(892)^0\mu^+\nu_\mu) \quad \Gamma_{40}/\Gamma_{39}$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.78	95	ABE	99P	CDF $\bar{p}p$ 1.8 TeV

$$\Gamma(\bar{K}^*(1410)^0\mu^+\nu_\mu)/\Gamma(\bar{K}^*(892)^0\mu^+\nu_\mu) \quad \Gamma_{41}/\Gamma_{39}$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.60	95	ABE	99P	CDF $\bar{p}p$ 1.8 TeV

$$\Gamma(\bar{K}_0^*(1430)^0\mu^+\nu_\mu)/\Gamma(K^-\pi^+\mu^+\nu_\mu) \quad \Gamma_{42}/\Gamma_{23}$$

Unseen decay modes of the  $\bar{K}_0^*(1430)^0$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.0064	90	LINK	05I	FOCS $\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

$$\Gamma(\bar{K}_2^*(1430)^0\mu^+\nu_\mu)/\Gamma(\bar{K}^*(892)^0\mu^+\nu_\mu) \quad \Gamma_{43}/\Gamma_{39}$$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.19	95	ABE	99P	CDF $\bar{p}p$ 1.8 TeV

$$\Gamma(\bar{K}^*(1680)^0\mu^+\nu_\mu)/\Gamma(K^-\pi^+\mu^+\nu_\mu) \quad \Gamma_{44}/\Gamma_{23}$$

Unseen decay modes of the  $\bar{K}^*(1680)^0$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.04	90	LINK	05I	FOCS $\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

**Hadronic modes with a  $\bar{K}$  or  $\bar{K}KK$**  $\Gamma(K_S^0\pi^+)/\Gamma_{\text{total}}$  $\Gamma_{45}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0147±0.0006 OUR FIT</b>	Error includes scale factor of 1.1.			
<b>0.0155±0.0005±0.0006</b>	2230 ± 60	33 HE	05 CLEO	$e^+e^-$ at $\psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.016 ± 0.003 ± 0.001	161	ADLER	88C MRK3	$e^+e^-$ 3.77 GeV
0.017 ± 0.004	36	34 SCHINDLER	81 MRK2	$e^+e^-$ 3.771 GeV
0.017 ± 0.006	17	35 PERUZZI	77 MRK1	$e^+e^-$ 3.77 GeV

33 HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

34 SCHINDLER 81 (MARK-2) measures  $\sigma(e^+e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.14 \pm 0.03$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

35 PERUZZI 77 (MARK-1) measures  $\sigma(e^+e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.14 \pm 0.05$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

 $\Gamma(K_S^0\pi^+)/\Gamma(K^-\pi^+\pi^+)$  $\Gamma_{45}/\Gamma_{46}$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.1548±0.0032 OUR FIT</b>	Error includes scale factor of 1.3.			
<b>0.1533±0.0027 OUR AVERAGE</b>				
0.1530 ± 0.0023 ± 0.0016	10.6k	LINK	02B FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
0.174 ± 0.012 ± 0.011	473	36 BISHAI	97 CLE2	$e^+e^- \approx \gamma(4S)$
0.137 ± 0.015 ± 0.016	264	ANJOS	90C E691	Photoproduction

36 See BISHAI 97 for an isospin analysis of  $D^+ \rightarrow \bar{K}\pi$  amplitudes.

 $\Gamma(K^-\pi^+\pi^+)/\Gamma_{\text{total}}$  $\Gamma_{46}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0951±0.0034 OUR FIT</b>	Error includes scale factor of 1.1.			
<b>0.0945±0.0033 OUR AVERAGE</b>				
0.095 ± 0.002 ± 0.003	15.1k ± 130	37 HE	05 CLEO	$e^+e^-$ at $\psi(3770)$
0.093 ± 0.006 ± 0.008	1502	38 BAlest	94 CLE2	$e^+e^- \approx \gamma(4S)$
0.091 ± 0.013 ± 0.004	1164	ADLER	88C MRK3	$e^+e^-$ 3.77 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.064 $^{+0.015}_{-0.014}$		39 BARLAG	92C ACCM	$\pi^-$ Cu 230 GeV
0.063 $^{+0.028}_{-0.014}$ ± 0.011	8	39 AGUILAR-...	87F HYBR	$\pi p, pp$ 360, 400 GeV
0.091 ± 0.019	239	40 SCHINDLER	81 MRK2	$e^+e^-$ 3.771 GeV
0.086 ± 0.020	85	41 PERUZZI	77 MRK1	$e^+e^-$ 3.77 GeV

37 HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

38 BAlest 94 measures the ratio of  $D^+ \rightarrow K^-\pi^+\pi^+$  and  $D^0 \rightarrow K^-\pi^+$  branching fractions to be  $2.35 \pm 0.16 \pm 0.16$  and uses their absolute measurement of the  $D^0 \rightarrow K^-\pi^+$  fraction (AKERIB 93).

39 AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

40 SCHINDLER 81 (MARK-2) measures  $\sigma(e^+e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.38 \pm 0.05$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

41 PERUZZI 77 (MARK-1) measures  $\sigma(e^+e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.36 \pm 0.06$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

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#### $\Gamma(K^-\pi^+)_{S\text{-wave}}\pi^+/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{47}/\Gamma_{46}$

This is the “fit fraction” from the Dalitz-plot analysis. The  $K^-\pi^+$  *S*-wave includes a broad scalar  $\kappa$ , the  $K_0^*(1430)^0$ , and non-resonant background.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.786±0.014±0.018</b>	AITALA	06	E791 Dalitz fit, 15.1k events

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#### $\Gamma(\bar{K}_0^*(800)^0\pi^+, \bar{K}_0^*(800)\rightarrow K^-\pi^+)/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{48}/\Gamma_{46}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>			
0.478±0.121±0.053	42 AITALA	02	E791 See AITALA 06

<sup>42</sup> The  $K_0^*(800)$  is a broad scalar resonance that may not exist and is not included in the Summary Tables. AITALA 02 finds that including such a resonance in the fit to the  $D^+ \rightarrow K^-\pi^+\pi^+$  Dalitz plot greatly improves the fit. However, the results of AITALA 02 for the  $D^+ \rightarrow K^-\pi^+\pi^+$  Dalitz plot analysis so disagree with earlier analyses that averaging the results makes no sense.

#### $\Gamma(\bar{K}^*(892)^0\pi^+, \bar{K}^*(892)^0\rightarrow K^-\pi^+)/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{49}/\Gamma_{46}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.119±0.002±0.020</b>	AITALA	06	E791 Dalitz fit, 15.1k events

**• • • We do not use the following data for averages, fits, limits, etc. • • •**

0.123±0.010±0.009	43 AITALA	02	E791 See AITALA 06
0.137±0.006±0.009	FRABETTI	94G	E687 $\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
0.170±0.009±0.034	ANJOS	93	E691 $\gamma$ Be 90–260 GeV
0.14 ± 0.04 ± 0.04	ALVAREZ	91B	NA14 Photoproduction
0.13 ± 0.01 ± 0.07	ADLER	87	MRK3 $e^+e^-$ 3.77 GeV

<sup>43</sup> AITALA 02 includes a broad scalar  $K_0^*(800)$  in the fit to the  $D^+ \rightarrow K^-\pi^+\pi^+$  Dalitz plot. This (a) greatly improves the fit, and (b) gives results in other channels that greatly disagree with previous analyses. The disagreement is so large that it makes no sense to average the results with those of earlier experiments.

#### $\Gamma(\bar{K}_0^*(1430)^0\pi^+, \bar{K}_0^*(1430)^0\rightarrow K^-\pi^+)/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{50}/\Gamma_{46}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>			
0.125±0.014±0.005	44 AITALA	02	E791 See AITALA 06
0.284±0.022±0.059	FRABETTI	94G	E687 $\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
0.248±0.019±0.017	ANJOS	93	E691 $\gamma$ Be 90–260 GeV

<sup>44</sup> AITALA 02 includes a broad scalar  $K_0^*(800)$  in the fit to the  $D^+ \rightarrow K^-\pi^+\pi^+$  Dalitz plot. This (a) greatly improves the fit, and (b) gives results in other channels that greatly disagree with previous analyses. The disagreement is so large that it makes no sense to average the results with those of earlier experiments.

$\Gamma(\bar{K}_2^*(1430)^0 \pi^+, \bar{K}_2^*(1430)^0 \rightarrow K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{51}/\Gamma_{46}$ 

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.002±0.001 ±0.001</b>	AITALA 06	E791	Dalitz fit, 15.1k events
• • • We do not use the following data for averages, fits, limits, etc. • • •			

0.005±0.001 ±0.002 45 AITALA 02 E791 See AITALA 06

45 AITALA 02 includes a broad scalar  $K_0^*(800)$  in the fit to the  $D^+ \rightarrow K^- \pi^+ \pi^+$  Dalitz plot. This (a) greatly improves the fit, and (b) gives results in other channels that greatly disagree with previous analyses. The disagreement is so large that it makes no sense to average the results with those of earlier experiments.

 $\Gamma(\bar{K}^*(1680)^0 \pi^+, \bar{K}^*(1680)^0 \rightarrow K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{52}/\Gamma_{46}$ 

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.012±0.006±0.012</b>	AITALA 06	E791	Dalitz fit, 15.1k events
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.025±0.007±0.003	46 AITALA 02	E791	See AITALA 06
0.047±0.006±0.007	FRABETTI 94G	E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
0.030±0.004±0.013	ANJOS 93	E691	$\gamma$ Be 90–260 GeV

46 AITALA 02 includes a broad scalar  $K_0^*(800)$  in the fit to the  $D^+ \rightarrow K^- \pi^+ \pi^+$  Dalitz plot. This (a) greatly improves the fit, and (b) gives results in other channels that greatly disagree with previous analyses. The disagreement is so large that it makes no sense to average the results with those of earlier experiments.

 $\Gamma(K^- \pi^+ \pi^+ \text{ nonresonant})/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{53}/\Gamma_{46}$ 

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.130±0.058±0.044	47 AITALA 02	E791	See AITALA 06
0.998±0.037±0.072	FRABETTI 94G	E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
0.838±0.088±0.275	ANJOS 93	E691	$\gamma$ Be 90–260 GeV
0.79 ±0.07 ±0.15	ADLER 87	MRK3	$e^+ e^-$ 3.77 GeV

47 AITALA 02 includes a broad scalar  $K_0^*(800)$  in the fit to the  $D^+ \rightarrow K^- \pi^+ \pi^+$  Dalitz plot. This (a) greatly improves the fit, and (b) gives results in other channels that greatly disagree with previous analyses. The disagreement is so large that it makes no sense to average the results with those of earlier experiments.

 $\Gamma(K_S^0 \pi^+ \pi^0)/\Gamma_{\text{total}}$   $\Gamma_{54}/\Gamma$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.070±0.005 OUR FIT</b>	Error includes scale factor of 1.3.			
<b>0.072±0.002±0.004</b>	5090±100	48 HE	05 CLEO	$e^+ e^-$ at $\psi(3770)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.051±0.013±0.008	159	ADLER	88C MRK3	$e^+ e^-$ 3.77 GeV
0.09 ±0.06	10	49 SCHINDLER	81 MRK2	$e^+ e^-$ 3.771 GeV

48 HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

49 SCHINDLER 81 (MARK-2) measures  $\sigma(e^+ e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.78 \pm 0.48$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

### $\Gamma(K_S^0 \rho^+)/\Gamma(K_S^0 \pi^+ \pi^0)$

$\Gamma_{55}/\Gamma_{54}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.68±0.08±0.12</b>	ADLER	87	MRK3 $e^+ e^-$ 3.77 GeV

### $\Gamma(\bar{K}^*(892)^0 \pi^+, \bar{K}^*(892)^0 \rightarrow K_S^0 \pi^0)/\Gamma(K_S^0 \pi^+ \pi^0)$

$\Gamma_{56}/\Gamma_{54}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.19±0.06±0.06</b>	ADLER	87	MRK3 $e^+ e^-$ 3.77 GeV

### $\Gamma(K_S^0 \pi^+ \pi^0 \text{ nonresonant})/\Gamma(K_S^0 \pi^+ \pi^0)$

$\Gamma_{57}/\Gamma_{54}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.13±0.07±0.08</b>	ADLER	87	MRK3 $e^+ e^-$ 3.77 GeV

### $\Gamma(K^- \pi^+ \pi^+ \pi^0)/\Gamma_{\text{total}}$

$\Gamma_{58}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0600±0.0028 OUR FIT</b>	Error includes scale factor of 1.1.			

**0.060 ±0.002 ±0.002** 4840±100 50 HE 05 CLEO  $e^+ e^-$  at  $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.058 ±0.012 ±0.012 142 COFFMAN 92B MRK3  $e^+ e^-$  3.77 GeV

0.063 +0.014 -0.013 ±0.012 175 BALTRUSAIT..86E MRK3 See COFFMAN 92B

50 HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

### $\Gamma(K^- \pi^+ \pi^+ \pi^0)/\Gamma(K^- \pi^+ \pi^+)$

$\Gamma_{58}/\Gamma_{46}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.76±0.11±0.12 91 ANJOS 92C E691  $\gamma$ Be 90–260 GeV

0.69±0.10±0.16 ANJOS 89E E691 See ANJOS 92C

### $\Gamma(\bar{K}^*(892)^0 \rho^+ \text{ total})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$

$\Gamma_{84}/\Gamma_{58}$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.33±0.165±0.12</b>	51 ANJOS	92C E691	$\gamma$ Be 90–260 GeV

51 See, however, the next entry, where the two experiments disagree completely.

### $\Gamma(\bar{K}^*(892)^0 \rho^+ S\text{-wave})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$

$\Gamma_{85}/\Gamma_{58}$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. The two experiments here disagree completely.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.26 ±0.25 OUR AVERAGE</b>	Error includes scale factor of 3.1.		
0.15 ±0.075±0.045	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
0.833±0.116±0.165	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

$\Gamma(\bar{K}^*(892)^0 \rho^+ P\text{-wave})/\Gamma_{\text{total}}$  $\Gamma_{86}/\Gamma$ Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>&lt;0.001</b>	90	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.005	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

 $\Gamma(\bar{K}^*(892)^0 \rho^+ D\text{-wave})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$  $\Gamma_{87}/\Gamma_{58}$ Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.15±0.09±0.045</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(\bar{K}^*(892)^0 \rho^+ D\text{-wave longitudinal})/\Gamma_{\text{total}}$  $\Gamma_{88}/\Gamma$ Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.007	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

 $\Gamma(\bar{K}_1(1400)^0 \pi^+)/\Gamma(K^- \pi^+ \pi^+ \pi^0)$  $\Gamma_{90}/\Gamma_{58}$ Unseen decay modes of the  $\bar{K}_1(1400)^0$  are included.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.907±0.218±0.180</b>	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

 $\Gamma(K^- \rho^+ \pi^+ \text{total})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$  $\Gamma_{61}/\Gamma_{58}$ This includes  $\bar{K}^*(892)^0 \rho^+$ , etc. The next entry gives the specifically 3-body fraction.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.48±0.13±0.09</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(K^- \rho^+ \pi^+ \text{3-body})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$  $\Gamma_{62}/\Gamma_{58}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.17 ±0.06 OUR AVERAGE</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
0.18 ±0.08 ±0.04			
0.159±0.065±0.060	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

 $\Gamma(\bar{K}^*(892)^0 \pi^+ \pi^0 \text{total})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$  $\Gamma_{92}/\Gamma_{58}$ This includes  $\bar{K}^*(892)^0 \rho^+$ , etc. The next two entries give the specifically 3-body fraction. Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.05±0.11±0.08</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(\bar{K}^*(892)^0 \pi^+ \pi^0 \text{3-body})/\Gamma_{\text{total}}$  $\Gamma_{93}/\Gamma$ Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.008	90	52 COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

52 See, however, the next entry: ANJOS 92C sees a large signal in this channel.

$\Gamma(\overline{K}^*(892)^0 \pi^+ \pi^0 \text{3-body})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$   $\Gamma_{93}/\Gamma_{58}$

Unseen decay modes of the  $\overline{K}^*(892)^0$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.66±0.09±0.17</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

$\Gamma(K^*(892)^- \pi^+ \pi^+ \text{3-body})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$   $\Gamma_{95}/\Gamma_{58}$

Unseen decay modes of the  $K^*(892)^-$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.24±0.12±0.09</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

$\Gamma(K^- \pi^+ \pi^+ \pi^0 \text{nonresonant})/\Gamma_{\text{total}}$   $\Gamma_{66}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.002 90 53 ANJOS 92C E691  $\gamma$ Be 90–260 GeV

53 Whereas ANJOS 92C finds no signal here, COFFMAN 92B finds a fairly large one; see the next entry.

$\Gamma(K^- \pi^+ \pi^+ \pi^0 \text{nonresonant})/\Gamma(K^- \pi^+ \pi^+ \pi^0)$   $\Gamma_{66}/\Gamma_{58}$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.184±0.070±0.050</b>	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

$\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)/\Gamma_{\text{total}}$   $\Gamma_{67}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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**0.0310±0.0022 OUR FIT** Error includes scale factor of 1.1.

**0.032 ±0.001 ±0.002**  $3210 \pm 85$  54 HE 05 CLEO  $e^+ e^-$  at  $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.021  $+0.010$   
-0.009 55 BARLAG 92C ACCM  $\pi^-$  Cu 230 GeV

0.033  $\pm 0.008$   $\pm 0.002$  168 ADLER 88C MRK3  $e^+ e^-$  3.77 GeV

0.122  $+0.032$   
-0.021 11 55 AGUILAR-... 87F HYBR  $\pi p, pp$  360, 400 GeV

0.06  $\pm 0.03$  21 56 SCHINDLER 81 MRK2  $e^+ e^-$  3.771 GeV

54 HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

55 AGUILAR-BENITEZ 87F and BARLAG 92C compute the branching fraction by topological normalization.

56 SCHINDLER 81 (MARK-2) measures  $\sigma(e^+ e^- \rightarrow \psi(3770)) \times$  branching fraction to be  $0.51 \pm 0.08$  nb. We use the MARK-3 (ADLER 88C) value of  $\sigma = 4.2 \pm 0.6 \pm 0.3$  nb.

$\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{67}/\Gamma_{46}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.327±0.018 OUR FIT</b>	Error includes scale factor of 1.1.			

**0.39 ±0.04 ±0.06**  $229 \pm 17$  ANJOS 92C E691  $\gamma$ Be 90–260 GeV

$\Gamma(K_S^0 a_1(1260)^+)/\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)$   $\Gamma_{82}/\Gamma_{67}$

Unseen decay modes of the  $a_1(1260)^+$  are included, assuming that the  $a_1(1260)^+$  decays entirely to  $\rho\pi$  [or at least to  $(\pi\pi)_{I=1}\pi$ ].

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.15 ±0.19 OUR AVERAGE</b>	Error includes scale factor of 1.1.		

1.66  $\pm 0.28$   $\pm 0.40$  ANJOS 92C E691  $\gamma$ Be 90–260 GeV

1.078  $\pm 0.114$   $\pm 0.140$  COFFMAN 92B MRK3  $e^+ e^-$  3.77 GeV

### $\Gamma(K_S^0 a_2(1320)^+)/\Gamma_{\text{total}}$

$\Gamma_{83}/\Gamma$

Unseen decay modes of the  $a_2(1320)^+$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0015	90	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.004	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

### $\Gamma(\bar{K}_1(1270)^0 \pi^+)/\Gamma_{\text{total}}$

$\Gamma_{89}/\Gamma$

Unseen decay modes of the  $\bar{K}_1(1270)^0$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.007	90	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.011	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

### $\Gamma(\bar{K}_1(1400)^0 \pi^+)/\Gamma_{\text{total}}$

$\Gamma_{90}/\Gamma$

Unseen decay modes of the  $\bar{K}_1(1400)^0$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.009	90	57 ANJOS	92C E691	$\gamma$ Be 90–260 GeV
57 ANJOS 92C sees no evidence for $\bar{K}_1(1400)^0 \pi^+$ in either the $\bar{K}^0 \pi^+ \pi^+ \pi^-$ or $K^- \pi^+ \pi^+ \pi^0$ channels, whereas COFFMAN 92B finds the $\bar{K}_1(1400)^0 \pi^+$ branching fraction to be large; see the next entry.				

### $\Gamma(\bar{K}_1(1400)^0 \pi^+)/\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)$

$\Gamma_{90}/\Gamma_{67}$

Unseen decay modes of the  $\bar{K}_1(1400)^0$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>1.246±0.212±0.360</b>	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

### $\Gamma(\bar{K}^*(1410)^0 \pi^+)/\Gamma_{\text{total}}$

$\Gamma_{91}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.007	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

### $\Gamma(K^*(892)^- \pi^+ \pi^+ \text{ total})/\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)$

$\Gamma_{94}/\Gamma_{67}$

Unseen decay modes of the  $K^*(892)^-$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
0.82±0.28	14	ALEEV	94 BIS2	$n N$ 20–70 GeV

### $\Gamma(K^*(892)^- \pi^+ \pi^+ \text{ 3-body})/\Gamma_{\text{total}}$

$\Gamma_{95}/\Gamma$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.013	90	COFFMAN	92B MRK3	$e^+ e^-$ 3.77 GeV

$\Gamma(K^*(892)^-\pi^+\pi^+ \text{3-body})/\Gamma(K_S^0\pi^+\pi^+\pi^-)$   $\Gamma_{95}/\Gamma_{67}$ 
Unseen decay modes of the  $K^*(892)^-$  are included.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1.00±0.18±0.42</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(K_S^0\rho^0\pi^+ \text{total})/\Gamma(K_S^0\pi^+\pi^+\pi^-)$   $\Gamma_{71}/\Gamma_{67}$ 
This includes  $\bar{K}^0 a_1(1260)^+$ . The next two entries give the specifically 3-body reaction.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.60±0.10±0.17</b>	90	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(K_S^0\rho^0\pi^+ \text{3-body})/\Gamma_{\text{total}}$   $\Gamma_{72}/\Gamma$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				

<0.002 90 COFFMAN 92B MRK3  $e^+e^-$  3.77 GeV
 $\Gamma(K_S^0\rho^0\pi^+ \text{3-body})/\Gamma(K_S^0\pi^+\pi^+\pi^-)$   $\Gamma_{72}/\Gamma_{67}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.07±0.04±0.06</b>	ANJOS	92C E691	$\gamma$ Be 90–260 GeV

 $\Gamma(K_S^0f_0(980)\pi^+)/\Gamma_{\text{total}}$   $\Gamma_{96}/\Gamma$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				

<0.0025 90 ANJOS 92C E691  $\gamma$  Be 90–260 GeV
 $\Gamma(K_S^0\pi^+\pi^+\pi^- \text{nonresonant})/\Gamma(K_S^0\pi^+\pi^+\pi^-)$   $\Gamma_{73}/\Gamma_{67}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.12±0.06 OUR AVERAGE</b>			
0.10±0.04 ±0.06	ANJOS	92C E691	$\gamma$ Be 90–260 GeV
0.17±0.056±0.100	COFFMAN	92B MRK3	$e^+e^-$ 3.77 GeV

 $\Gamma(K^-3\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$   $\Gamma_{74}/\Gamma_{46}$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.061±0.005 OUR FIT</b>	Error includes scale factor of 1.1.			

**0.062±0.008 OUR AVERAGE** Error includes scale factor of 1.3.  
 0.058±0.002±0.006 2923 LINK 03D FOCS  $\gamma$  A,  $\bar{E}_\gamma$  ≈ 180 GeV  
 0.077±0.008±0.010 239 FRABETTI 97C E687  $\gamma$  Be,  $\bar{E}_\gamma$  ≈ 200 GeV

 $\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$ 

0.09 ±0.01 ±0.01 113 ANJOS 90D E691 Photoproduction

 $\Gamma(\bar{K}^*(892)^0\pi^+\pi^+\pi^-, \bar{K}^*(892)^0 \rightarrow K^-\pi^+)/\Gamma(K^-3\pi^+\pi^-)$   $\Gamma_{75}/\Gamma_{74}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.21±0.04±0.06</b>	LINK	03D FOCS	$\gamma$ A, $\bar{E}_\gamma$ ≈ 180 GeV

 $\Gamma(\bar{K}^*(892)^0\rho^0\pi^+, \bar{K}^*(892)^0 \rightarrow K^-\pi^+)/\Gamma(K^-3\pi^+\pi^-)$   $\Gamma_{76}/\Gamma_{74}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.40±0.03±0.06</b>	LINK	03D FOCS	$\gamma$ A, $\bar{E}_\gamma$ ≈ 180 GeV

$\Gamma(\bar{K}^*(892)^0 \rho^0 \pi^+, \bar{K}^*(892)^0 \rightarrow K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{76}/\Gamma_{46}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$0.016 \pm 0.007 \pm 0.004$	FRABETTI 97C E687	$\gamma$ Be, $\bar{E}_\gamma$	$\approx 200$ GeV

 $\Gamma(\bar{K}^*(892)^0 \pi^+ \pi^+ \pi^- \text{ no-}\rho, \bar{K}^*(892)^0 \rightarrow K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{77}/\Gamma_{46}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$0.032 \pm 0.010 \pm 0.008$	FRABETTI 97C E687	$\gamma$ Be, $\bar{E}_\gamma$	$\approx 200$ GeV

 $\Gamma(K^- \rho^0 \pi^+ \pi^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{78}/\Gamma_{46}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$			
$0.034 \pm 0.009 \pm 0.005$	FRABETTI 97C E687	$\gamma$ Be, $\bar{E}_\gamma$	$\approx 200$ GeV

 $\Gamma(K^- \rho^0 \pi^+ \pi^+)/\Gamma(K^- 3\pi^+ \pi^-)$   $\Gamma_{78}/\Gamma_{74}$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.30 <math>\pm 0.04 \pm 0.01</math></b>	LINK 03D	FOCS	$\gamma$ A, $\bar{E}_\gamma \approx 180$ GeV

 $\Gamma(\bar{K}^*(892)^0 a_1(1260)^+)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{97}/\Gamma_{46}$ Unseen decay modes of the  $\bar{K}^*(892)^0$  and  $a_1(1260)^+$  are included.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.099 <math>\pm 0.008 \pm 0.018</math></b>	LINK 03D	FOCS	$\gamma$ A, $\bar{E}_\gamma \approx 180$ GeV

 $\Gamma(K^- 3\pi^+ \pi^- \text{ nonresonant})/\Gamma(K^- 3\pi^+ \pi^-)$   $\Gamma_{79}/\Gamma_{74}$ 

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.07 <math>\pm 0.05 \pm 0.01</math></b>		LINK 03D	FOCS	$\gamma$ A, $\bar{E}_\gamma \approx 180$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.026	90	FRABETTI 97C E687	$\gamma$ Be, $\bar{E}_\gamma$	$\approx 200$ GeV

 $\Gamma(K^+ 2K_S^0)/\Gamma(K^- \pi^+ \pi^+)$   $\Gamma_{80}/\Gamma_{46}$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.049 <math>\pm 0.022</math> OUR AVERAGE</b>				Error includes scale factor of 2.4.
0.035 $\pm 0.010 \pm 0.005$	39 $\pm$ 9	ALBRECHT 94I	ARG	$e^+ e^- \approx 10$ GeV
0.085 $\pm 0.018$	70 $\pm$ 12	AMMAR 91	CLEO	$e^+ e^- \approx 10.5$ GeV

 $\Gamma(K^+ K^- K_S^0 \pi^+)/\Gamma(K_S^0 \pi^+ \pi^+ \pi^-)$   $\Gamma_{81}/\Gamma_{67}$ 

<u>VALUE (units <math>10^{-3}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>7.7 <math>\pm 1.5 \pm 0.9</math></b>	35 $\pm$ 7	LINK 01C	FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

**Pionic modes**

### $\Gamma(\pi^+ \pi^0)/\Gamma(K^- \pi^+ \pi^+)$

$\Gamma_{98}/\Gamma_{46}$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>1.34 \pm 0.07</math> OUR AVERAGE</b>				
$1.33 \pm 0.11 \pm 0.09$	$1229 \pm 99$	AUBERT,B	06F BABR	$e^+ e^- \approx \gamma(4S)$
$1.33 \pm 0.07 \pm 0.06$	$914 \pm 46$	RUBIN	06 CLEO	$e^+ e^-$ at $\psi(3770)$
$1.44 \pm 0.19 \pm 0.10$	$171 \pm 22$	ARMS	04 CLEO	$e^+ e^- \approx 10$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$2.8 \pm 0.6 \pm 0.5$	34	SELEN	93 CLE2	See ARMS 04

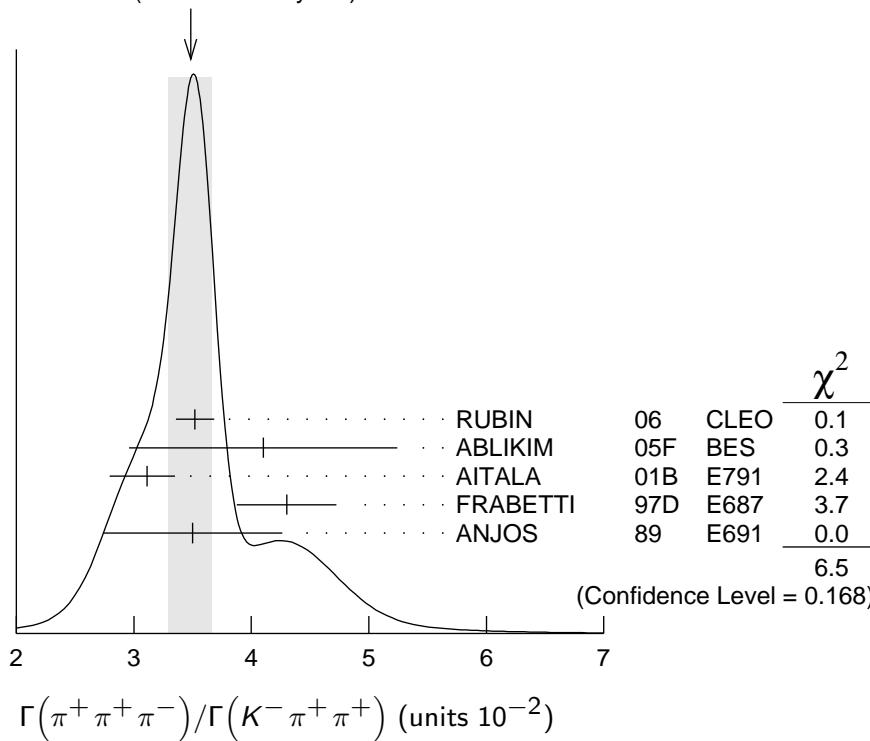
### $\Gamma(\pi^+ \pi^+ \pi^-)/\Gamma(K^- \pi^+ \pi^+)$

$\Gamma_{99}/\Gamma_{46}$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>3.48 \pm 0.19</math> OUR AVERAGE</b> Error includes scale factor of 1.4. See the ideogram below.				
$3.52 \pm 0.11 \pm 0.12$	$3303 \pm 95$	RUBIN	06 CLEO	$e^+ e^-$ at $\psi(3770)$
$4.1 \pm 1.1 \pm 0.3$	$85 \pm 22$	ABLIKIM	05F BES	$e^+ e^- \approx \psi(3770)$
$3.11 \pm 0.18^{+0.16}_{-0.26}$	1172	ITALA	01B E791	$\pi^-$ nucleus, 500 GeV
$4.3 \pm 0.3 \pm 0.3$	236	FRAZETTI	97D E687	$\gamma$ Be $\approx$ 200 GeV
$3.5 \pm 0.7 \pm 0.3$	83	ANJOS	89 E691	Photoproduction
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$3.2 \pm 1.1 \pm 0.3$	20	ADAMOVICH	93 WA82	$\pi^-$ 340 GeV
$4.2 \pm 1.6 \pm 1.0$	57	BALTRUSAIT..85E	MRK3	$e^+ e^-$ 3.77 GeV

#### WEIGHTED AVERAGE

$3.48 \pm 0.19$  (Error scaled by 1.4)



### $\Gamma(\rho^0\pi^+)/\Gamma(\pi^+\pi^+\pi^-)$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.322 ± 0.027 OUR AVERAGE</b>			
0.3082 ± 0.0314 ± 0.0230	LINK	04	FOCS Dalitz fit, 1527 ± 51 evts
0.336 ± 0.032 ± 0.022	AITALA	01B	E791 Dalitz fit, 1172 evts
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.289 ± 0.055 ± 0.058	58 FRABETTI	97D	E687 $\gamma$ Be ≈ 200 GeV
58 FRABETTI 97D also includes $f_2(1270)\pi^+$ and $f_0(980)\pi^+$ modes in the fit, but the resulting decay fractions are not statistically significant.			

### $\Gamma(\pi^+(\pi^+\pi^-)S\text{-wave})/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{100}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis. See also the next three data blocks.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.5600 ± 0.0324 ± 0.0214</b>	59 LINK	04	FOCS Dalitz fit, 1527 ± 51 evts

59 LINK 04 borrows a K-matrix parametrization from ANISOVICH 03 of the full  $\pi\pi$  S-wave isoscalar scattering amplitude to describe the  $\pi^+\pi^-$  S-wave component of the  $\pi^+\pi^+\pi^-$  state. The fit fraction given above is a sum over five  $f_0$  mesons, the  $f_0(980)$ ,  $f_0(1300)$ ,  $f_0(1200\text{--}1600)$ ,  $f_0(1500)$ , and  $f_0(1750)$ . See LINK 04 for details and discussion.

### $\Gamma(\sigma\pi^+, \sigma \rightarrow \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{102}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.463 ± 0.090 ± 0.021</b>	AITALA	01B	E791 Dalitz fit, 1172 evts

### $\Gamma(f_0(980)\pi^+, f_0(980) \rightarrow \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{103}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.062 ± 0.013 ± 0.004</b>	AITALA	01B	E791 Dalitz fit, 1172 evts

### $\Gamma(f_0(1370)\pi^+, f_0(1370) \rightarrow \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{104}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.023 ± 0.015 ± 0.008</b>	AITALA	01B	E791 Dalitz fit, 1172 evts

### $\Gamma(f_2(1270)\pi^+, f_2(1270) \rightarrow \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{105}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.15 ± 0.04 OUR AVERAGE</b>			Error includes scale factor of 2.4.
0.1174 ± 0.0190 ± 0.0029	LINK	04	FOCS Dalitz fit, 1527 ± 51 evts
0.194 ± 0.025 ± 0.004	AITALA	01B	E791 Dalitz fit, 1172 evts

### $\Gamma(\rho(1450)^0\pi^+, \rho(1450)^0 \rightarrow \pi^+\pi^-)/\Gamma(\pi^+\pi^+\pi^-)$

### $\Gamma_{106}/\Gamma_{99}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.007 ± 0.007 ± 0.003	AITALA	01B	E791 Dalitz fit, 1172 evts

$\Gamma(\pi^+\pi^+\pi^- \text{ nonresonant})/\Gamma(\pi^+\pi^+\pi^-)$  $\Gamma_{107}/\Gamma_{99}$ 

This is the “fit fraction” from the Dalitz-plot analysis. The big difference between the results here of AITALA 01B and FRABETTI 97D is the addition of the  $\sigma\pi^+$  channel to the AITALA 01B fit. LINK 04 (see earlier data blocks), in agreement with AITALA 01B, finds no evidence for a large nonresonant fraction.

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>			
$0.078 \pm 0.060 \pm 0.027$	AITALA	01B	E791 Dalitz fit, 1172 evts
$0.589 \pm 0.105 \pm 0.081$	60 FRABETTI	97D	E687 $\gamma$ Be $\approx$ 200 GeV

<sup>60</sup> FRABETTI 97D also includes  $f_2(1270)\pi^+$  and  $f_0(980)\pi^+$  modes in the fit, but the resulting decay fractions are not statistically significant.

 $\Gamma(\pi^+2\pi^0)/\Gamma(K^-\pi^+\pi^+)$  $\Gamma_{108}/\Gamma_{46}$ 

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>5.0 \pm 0.3 \pm 0.3</math></b>	$1535 \pm 89$	RUBIN	06	CLEO $e^+e^-$ at $\psi(3770)$

 $\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(K^-\pi^+\pi^+)$  $\Gamma_{109}/\Gamma_{46}$ 

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>12.4 \pm 0.5 \pm 0.6</math></b>	$5701 \pm 205$	RUBIN	06	CLEO $e^+e^-$ at $\psi(3770)$

 $\Gamma(\eta\pi^+)/\Gamma(\phi\pi^+)$  $\Gamma_{114}/\Gamma_{136}$ 

Unseen decay modes of the  $\eta$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.54 \pm 0.06</math> OUR FIT</b>				
<b><math>0.49 \pm 0.08</math></b>	275	JESSOP	98	CLE2 $e^+e^-$ $\approx$ $\gamma(4S)$

 $\Gamma(\eta\pi^+)/\Gamma(K^-\pi^+\pi^+)$  $\Gamma_{114}/\Gamma_{46}$ 

Unseen decay modes of the  $\eta$  are included.

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>3.68 \pm 0.31</math> OUR FIT</b>				
<b><math>3.81 \pm 0.26 \pm 0.21</math></b>	$377 \pm 26$	RUBIN	06	CLEO $e^+e^-$ at $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$8.3 \pm 2.3 \pm 1.4$	99	DAOUDI	92	CLE2 See JESSOP 98
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 $\Gamma(\omega\pi^+)/\Gamma_{\text{total}}$  $\Gamma_{115}/\Gamma$ 

Unseen decay modes of the  $\omega$  are included.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>&lt;3.4 \times 10^{-4}</math></b>	90	RUBIN	06	CLEO $e^+e^-$ at $\psi(3770)$

 $\Gamma(3\pi^+2\pi^-)/\Gamma(K^-\pi^+\pi^+)$  $\Gamma_{112}/\Gamma_{46}$ 

<u>VALUE (units <math>10^{-2}</math>)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>1.77 \pm 0.17</math> OUR FIT</b>				

<b><math>1.73 \pm 0.20 \pm 0.17</math></b>	$732 \pm 77$	RUBIN	06	CLEO $e^+e^-$ at $\psi(3770)$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$2.3 \pm 0.4 \pm 0.2$	58	FRABETTI	97C	E687 $\gamma$ Be, $\bar{E}_\gamma$ $\approx$ 200 GeV
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 $\Gamma(3\pi^+2\pi^-)/\Gamma(K^-\pi^+\pi^-)$  $\Gamma_{112}/\Gamma_{74}$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.289 \pm 0.019</math> OUR FIT</b>				
<b><math>0.290 \pm 0.017 \pm 0.011</math></b>	835	LINK	03D	FOCS $\gamma$ A, $\bar{E}_\gamma$ $\approx$ 180 GeV

### $\Gamma(\eta\rho^+)/\Gamma(\phi\pi^+)$

Unseen decay modes of the  $\eta$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.11</b>	90	JESSOP	98	CLE2 $e^+e^- \approx \gamma(4S)$

### $\Gamma_{116}/\Gamma_{136}$

### $\Gamma(\eta'(958)\pi^+)/\Gamma(\phi\pi^+)$

Unseen decay modes of the  $\eta'(958)$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.82±0.14</b>	126	JESSOP	98	CLE2 $e^+e^- \approx \gamma(4S)$

### $\Gamma_{117}/\Gamma_{136}$

### $\Gamma(\eta'(958)\rho^+)/\Gamma(\phi\pi^+)$

Unseen decay modes of the  $\eta'(958)$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.86</b>	90	JESSOP	98	CLE2 $e^+e^- \approx \gamma(4S)$

### $\Gamma_{118}/\Gamma_{136}$

## Hadronic modes with a $K\bar{K}$ pair

### $\Gamma(K^+K_S^0)/\Gamma(K_S^0\pi^+)$

### $\Gamma_{119}/\Gamma_{45}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.201 ± 0.011 OUR FIT</b>				
<b>0.206 ± 0.014 OUR AVERAGE</b>				
0.222 ± 0.037 ± 0.013	63 ± 10	ABLIKIM	05F BES	$e^+e^- \approx \psi(3770)$
0.1892 ± 0.0155 ± 0.0073	278 ± 21	ARMS	04 CLEO	$e^+e^- \approx 10 \text{ GeV}$
0.25 ± 0.04 ± 0.02	129	FRABETTI	95 E687	$\gamma\text{Be } \bar{E}_\gamma \approx 200 \text{ GeV}$
0.271 ± 0.065 ± 0.039	69	ANJOS	90C E691	$\gamma\text{Be}$
0.317 ± 0.086 ± 0.048	31	BALTRUSAIT..85E	MRK3	$e^+e^- 3.77 \text{ GeV}$
0.25 ± 0.15	6	SCHINDLER	81 MRK2	$e^+e^- 3.771 \text{ GeV}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.1996 ± 0.0119 ± 0.0096	949	61 LINK	02B FOCS	$\gamma A, \bar{E}_\gamma \approx 180 \text{ GeV}$
0.222 ± 0.041 ± 0.019	70	62 BISHAI	97 CLE2	See ARMS 04

<sup>61</sup>This LINK 02B result is redundant with a result in the next datablock.

<sup>62</sup>This BISHAI 97 result is redundant with results elsewhere in the Listings.

### $\Gamma(K^+K_S^0)/\Gamma(K^-\pi^+\pi^+)$

### $\Gamma_{119}/\Gamma_{46}$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>3.11±0.17 OUR FIT</b>				
<b>3.02±0.18±0.15</b>	949	LINK	02B FOCS	$\gamma \text{nucleus}, \bar{E}_\gamma \approx 180 \text{ GeV}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3.86 ± 0.69 ± 0.37	70	63 BISHAI	97 CLE2	See ARMS 04

<sup>63</sup>See BISHAI 97 for an isospin analysis of  $D^+ \rightarrow K\bar{K}$  amplitudes.

### $\Gamma(K^+K^-\pi^+)/\Gamma_{\text{total}}$

### $\Gamma_{120}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.0100±0.0004 OUR FIT</b>				Error includes scale factor of 1.2.
<b>0.0097±0.0004±0.0004</b>	1250 ± 40	<sup>64</sup> HE	05 CLEO	$e^+e^- \text{ at } \psi(3770)$

<sup>64</sup>HE 05 uses single- and double-tagged events in an overall fit. The fraction here includes (unobserved) final-state photons.

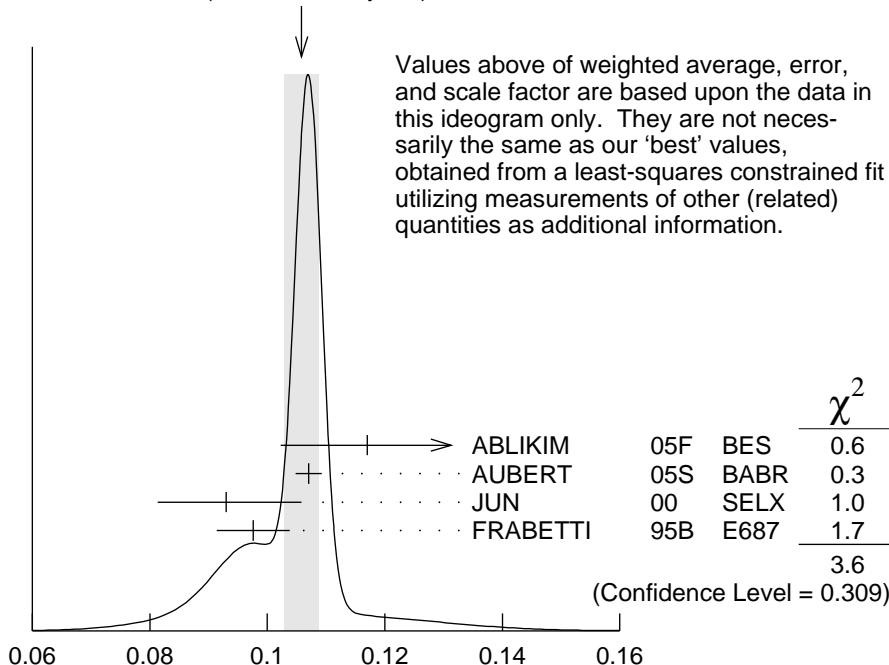
### $\Gamma(K^+ K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$

### $\Gamma_{120}/\Gamma_{46}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.1054±0.0025 OUR FIT</b>	Error includes scale factor of 1.3.			
<b>0.1058±0.0029 OUR AVERAGE</b>	Error includes scale factor of 1.4. See the ideogram below.			
0.117 ± 0.013 ± 0.007	181 ± 20	ABLIKIM	05F BES	$e^+ e^- \approx \psi(3770)$
0.107 ± 0.001 ± 0.002	43k	AUBERT	05S BABR	$e^+ e^- \approx \Upsilon(4S)$
0.093 ± 0.010 +0.008 -0.006		JUN	00 SELX	$\Sigma^-$ nucleus, 600 GeV
0.0976 ± 0.0042 ± 0.0046		FRABETTI	95B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 200$ GeV

WEIGHTED AVERAGE

0.1058±0.0029 (Error scaled by 1.4)



### $\Gamma(K^+ K^- \pi^+)/\Gamma(K^- \pi^+ \pi^+)$

### $\Gamma_{120}/\Gamma_{46}$

### $\Gamma(\phi\pi^+, \phi \rightarrow K^+ K^-)/\Gamma(K^+ K^- \pi^+)$

### $\Gamma_{121}/\Gamma_{120}$

This is the "fit fraction" from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.317±0.034 OUR FIT</b>			
<b>0.292±0.031±0.030</b>	FRABETTI	95B E687	Dalitz fit, 915 evts

### $\Gamma(\phi\pi^+, \phi \rightarrow K^+ K^-)/\Gamma(\phi\pi^+)$

### $\Gamma_{121}/\Gamma_{136}$

VALUE	DOCUMENT ID
<b>0.491±0.006 OUR FIT</b>	
<b>0.491±0.006</b>	65 PDG 06

<sup>65</sup> This is, of course, just the  $\phi \rightarrow K^+ K^-$  branching fraction, but we need it to connect other modes in the fit.

### $\Gamma(\phi\pi^+)/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{136}/\Gamma_{46}$

Unseen decay modes of the  $\phi$  are included. However, we now get branching fractions for resonant submodes of  $K^+K^-\pi^+$  decays from Dalitz-plot analyses.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>				
0.057±0.011±0.003	46 ± 9	ABLIKIM	06P BES2	$e^+e^-$ at 3773 MeV
0.062±0.017±0.006	19	ADAMOVICH	93 WA82	$\pi^-$ 340 GeV
0.077±0.011±0.005	128	DAOUDI	92 CLE2	$e^+e^- \approx 10.5$ GeV
0.098±0.032±0.014	12	ALVAREZ	90C NA14	Photoproduction
0.071±0.008±0.007	84	ANJOS	88 E691	Photoproduction
0.084±0.021±0.011	21	BALTRUSAIT..85E	MRK3	$e^+e^-$ 3.77 GeV

### $\Gamma(K^+\bar{K}^*(892)^0, \bar{K}^*(892)^0 \rightarrow K^-\pi^+)/\Gamma(K^+K^-\pi^+)$

$\Gamma_{122}/\Gamma_{120}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.301±0.020±0.025</b>	FRABETTI	95B E687	Dalitz fit, 915 evts

### $\Gamma(K^+\bar{K}_0^*(1430)^0, \bar{K}_0^*(1430)^0 \rightarrow K^-\pi^+)/\Gamma(K^+K^-\pi^+)$

$\Gamma_{123}/\Gamma_{120}$

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.370±0.035±0.018</b>	FRABETTI	95B E687	Dalitz fit, 915 evts

### $\Gamma(K^+\bar{K}^*(892)^0)/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{139}/\Gamma_{46}$

Unseen decay modes of the  $\bar{K}^*(892)^0$  are included. However, we now get branching fractions for resonant submodes of  $K^+K^-\pi^+$  decays from Dalitz-plot analyses.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>				
0.058±0.009±0.006	73	ANJOS	88 E691	Photoproduction
0.048±0.021±0.011	14	BALTRUSAIT..85E	MRK3	$e^+e^-$ 3.77 GeV

### $\Gamma(K^+K^-\pi^+ \text{ nonresonant})/\Gamma(K^-\pi^+\pi^+)$

$\Gamma_{124}/\Gamma_{46}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>• • • We do not use the following data for averages, fits, limits, etc. • • •</b>				
0.049±0.008±0.006	95	ANJOS	88 E691	Photoproduction
0.059±0.026±0.009	37	BALTRUSAIT..85E	MRK3	$e^+e^-$ 3.77 GeV

### $\Gamma(K^*(892)^+ K_S^0)/\Gamma(K_S^0\pi^+)$

$\Gamma_{140}/\Gamma_{45}$

Unseen decay modes of the  $K^*(892)^+$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.1±0.3±0.4</b>	67	FRABETTI	95 E687	$\gamma$ Be $\bar{E}_\gamma \approx 200$ GeV

### $\Gamma(\phi\pi^+\pi^0)/\Gamma_{\text{total}}$

$\Gamma_{137}/\Gamma$

Unseen decay modes of the  $\phi$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.023±0.010</b>	66 BARLAG	92C ACCM	$\pi^-$ Cu 230 GeV

<sup>66</sup> BARLAG 92C computes the branching fraction using topological normalization.

### $\Gamma(\phi\pi^+\pi^0)/\Gamma(K^-\pi^+\pi^+)$

Unseen decay modes of the  $\phi$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>• • •</b> We do not use the following data for averages, fits, limits, etc. <b>• • •</b>				
<0.58	90	ALVAREZ	90C	NA14 Photoproduction
<0.28	90	ANJOS	89E	E691 Photoproduction

### $\Gamma_{137}/\Gamma_{46}$

### $\Gamma(\phi\rho^+)/\Gamma(K^-\pi^+\pi^+)$

Unseen decay modes of the  $\phi$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.16</b>	90	DAOUDI	92	CLE2 $e^+e^- \approx 10.5$ GeV

### $\Gamma_{138}/\Gamma_{46}$

### $\Gamma(K^+K^-\pi^+\pi^0\text{non-}\phi)/\Gamma_{\text{total}}$

### $\Gamma_{130}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.015<sup>+0.007</sup><sub>-0.006</sub></b>	67 BARLAG	92C ACCM	$\pi^-$ Cu 230 GeV

67 BARLAG 92C computes the branching fraction using topological normalization.

### $\Gamma(K^+K^-\pi^+\pi^0\text{non-}\phi)/\Gamma(K^-\pi^+\pi^+)$

### $\Gamma_{130}/\Gamma_{46}$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>• • •</b> We do not use the following data for averages, fits, limits, etc. <b>• • •</b>				
<0.25	90	ANJOS	89E	E691 Photoproduction

### $\Gamma(K^+K_S^0\pi^+\pi^-)/\Gamma(K_S^0\pi^+\pi^+\pi^-)$

### $\Gamma_{131}/\Gamma_{67}$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>5.62<math>\pm</math>0.39<math>\pm</math>0.40</b>	$469 \pm 32$	LINK	01C FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

### $\Gamma(K_S^0K^-\pi^+\pi^+)/\Gamma(K_S^0\pi^+\pi^+\pi^-)$

### $\Gamma_{132}/\Gamma_{67}$

VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TECN	COMMENT
<b>7.68<math>\pm</math>0.41<math>\pm</math>0.32</b>	$670 \pm 35$	LINK	01C FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

### $\Gamma(K^*(892)^+\bar{K}^*(892)^0)/\Gamma_{\text{total}}$

### $\Gamma_{141}/\Gamma$

Unseen decay modes of the  $K^*(892)$ 's are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.026<math>\pm</math>0.008<math>\pm</math>0.007</b>	ALBRECHT	92B ARG	$e^+e^- \simeq 10.4$ GeV

### $\Gamma(K_S^0K^-\pi^+\pi^+(\text{non-}K^*+\bar{K}^{*0}))/\Gamma_{\text{total}}$

### $\Gamma_{134}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.004</b>	90	ALBRECHT	92B ARG	$e^+e^- \simeq 10.4$ GeV

### $\Gamma(K^+K^-\pi^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+\pi^-)$

### $\Gamma_{135}/\Gamma_{74}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.040<math>\pm</math>0.009<math>\pm</math>0.019</b>	38	LINK	03D FOCS	$\gamma$ A, $\bar{E}_\gamma \approx 180$ GeV

**Doubly Cabibbo-suppressed modes** **$\Gamma(K^+\pi^0)/\Gamma_{\text{total}}$**  **$\Gamma_{142}/\Gamma$** 

VALUE (units $10^{-4}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>2.37 \pm 0.32</math> OUR AVERAGE</b>					

2.52 $\pm 0.47 \pm 0.26$	189 $\pm 37$	AUBERT,B	06F BABR	$e^+ e^- \approx \gamma(4S)$
2.28 $\pm 0.36 \pm 0.17$	148 $\pm 23$	DYTMAN	06 CLEO	$e^+ e^-$ at $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<4.2	90	ARMS	04 CLEO	$e^+ e^- \approx 10$ GeV
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 **$\Gamma(K^+\pi^+\pi^-)/\Gamma(K^-\pi^+\pi^+)$**  **$\Gamma_{143}/\Gamma_{46}$** 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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 **$0.0068 \pm 0.0008$  OUR AVERAGE**

0.0065 $\pm 0.0008 \pm 0.0004$	189 $\pm 24$	LINK	04F FOCS	$\gamma A, \bar{E}_\gamma \approx 180$ GeV
0.0077 $\pm 0.0017 \pm 0.0008$	59 $\pm 13$	AITALA	97C E791	$\pi^- A, 500$ GeV
0.0072 $\pm 0.0023 \pm 0.0017$	21	FRABETTI	95E E687	$\gamma Be, \bar{E}_\gamma = 220$ GeV

 **$\Gamma(K^+\rho^0)/\Gamma(K^+\pi^+\pi^-)$**  **$\Gamma_{144}/\Gamma_{143}$** 

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.39 \pm 0.09$  OUR AVERAGE**

0.3943 $\pm 0.0787 \pm 0.0815$	LINK	04F FOCS	Dalitz fit, 189 evts
0.37 $\pm 0.14 \pm 0.07$	AITALA	97C E791	Dalitz fit, 59 evts

 **$\Gamma(K^+ f_0(980), f_0(980) \rightarrow \pi^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$**  **$\Gamma_{146}/\Gamma_{143}$** 

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.0892 \pm 0.0333 \pm 0.0412$** 

0.0892 $\pm 0.0333 \pm 0.0412$	LINK	04F FOCS	Dalitz fit, 189 evts
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 **$\Gamma(K^*(892)^0\pi^+, K^*(892)^0 \rightarrow K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$**  **$\Gamma_{145}/\Gamma_{143}$** 

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.47 \pm 0.08$  OUR AVERAGE**

0.5220 $\pm 0.0684 \pm 0.0638$	LINK	04F FOCS	Dalitz fit, 189 evts
0.35 $\pm 0.14 \pm 0.01$	AITALA	97C E791	Dalitz fit, 59 evts

 **$\Gamma(K_2^*(1430)^0\pi^+, K_2^*(1430)^0 \rightarrow K^+\pi^-)/\Gamma(K^+\pi^+\pi^-)$**  **$\Gamma_{147}/\Gamma_{143}$** 

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
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 **$0.0803 \pm 0.0372 \pm 0.0391$** 

0.0803 $\pm 0.0372 \pm 0.0391$	LINK	04F FOCS	Dalitz fit, 189 evts
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 **$\Gamma(K^+\pi^+\pi^- \text{ nonresonant})/\Gamma(K^+\pi^+\pi^-)$**  **$\Gamma_{148}/\Gamma_{143}$** 

This is the “fit fraction” from the Dalitz-plot analysis.

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.36 $\pm 0.14 \pm 0.07$	68 AITALA	97C E791	Dalitz fit, 59 evts
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68 LINK 04F, with three times as many events, finds no need for a nonresonant amplitude.

### $\Gamma(K^+ K^+ K^-)/\Gamma(K^- \pi^+ \pi^+)$

### $\Gamma_{149}/\Gamma_{46}$

VALUE (units $10^{-4}$ )	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>9.49 \pm 2.17 \pm 0.22</math></b>		65	69 LINK	02I FOCS	$\gamma$ nucleus, $\approx 180$ GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<16	90	70 FRABETTI	95F E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$570 \pm 200 \pm 70$	13	ADAMOVICH	93 WA82	$\pi^-$ 340 GeV

69 LINK 02I finds little evidence for  $\phi K^+$  or  $f_0(980) K^+$  submodes.

70 Using the  $\phi \pi^+$  mode to normalize, FRABETTI 95F gets  $\Gamma(K^+ K^+ K^-)/\Gamma(\phi \pi^+) < 0.025$ .

### $\Gamma(\phi K^+)/\Gamma(\phi \pi^+)$

### $\Gamma_{150}/\Gamma_{136}$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.021	90		FRABETTI	95F E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV

$0.058^{+0.032}_{-0.026} \pm 0.007$  4 71 ANJOS 92D E691  $\gamma$  Be,  $\bar{E}_\gamma = 145$  GeV

71 The evidence of ANJOS 92D is a small excess of events ( $4.5^{+2.4}_{-2.0}$ ).

### — Rare or forbidden modes —

### $\Gamma(\pi^+ e^+ e^-)/\Gamma_{\text{total}}$

### $\Gamma_{151}/\Gamma$

A test for the  $\Delta C = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>&lt;7.4 \times 10^{-6}</math></b>	90		HE	05A CLEO	$e^+ e^-$ at $\psi(3770)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<5.2 \times 10^{-5}$	90		AITALA	99G E791	$\pi^- N$ 500 GeV
$<1.1 \times 10^{-4}$	90		FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<6.6 \times 10^{-5}$	90		AITALA	96 E791	$\pi^- N$ 500 GeV
$<2.5 \times 10^{-3}$	90		WEIR	90B MRK2	$e^+ e^-$ 29 GeV
$<2.6 \times 10^{-3}$	90	39	HAAS	88 CLEO	$e^+ e^-$ 10 GeV

### $\Gamma(\pi^+ \phi, \phi \rightarrow e^+ e^-)/\Gamma_{\text{total}}$

### $\Gamma_{152}/\Gamma$

This is *not* a test for the  $\Delta C = 1$  weak neutral current, but leads to the  $\pi^+ e^+ e^-$  final state.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>(2.7^{+3.6}_{-1.8} \pm 0.2) \times 10^{-6}</math></b>	2	72 HE	05A CLEO	$e^+ e^-$ at $\psi(3770)$

72 This HE 05A result is consistent with the branching fraction for  $D^+ \rightarrow \phi \pi^+$ ,  $\phi \rightarrow K^+ K^-$ .

### $\Gamma(\pi^+ \mu^+ \mu^-)/\Gamma_{\text{total}}$

$\Gamma_{153}/\Gamma$

A test for the  $\Delta C = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<8.8 \times 10^{-6}$	90		LINK	03F	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$<1.5 \times 10^{-5}$	90		AITALA	99G	$\pi^- N$ 500 GeV
$<8.9 \times 10^{-5}$	90		FRABETTI	97B	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<1.8 \times 10^{-5}$	90		AITALA	96	$\pi^- N$ 500 GeV
$<2.2 \times 10^{-4}$	90	0	KODAMA	95	$\pi^-$ emulsion 600 GeV
$<5.9 \times 10^{-3}$	90		WEIR	90B	MRK2 $e^+ e^-$ 29 GeV
$<2.9 \times 10^{-3}$	90	36	HAAS	88	CLEO $e^+ e^-$ 10 GeV

### $\Gamma(\rho^+ \mu^+ \mu^-)/\Gamma_{\text{total}}$

$\Gamma_{154}/\Gamma$

A test for the  $\Delta C = 1$  weak neutral current. Allowed by higher-order electroweak interactions.

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<5.6 \times 10^{-4}$	90	0	KODAMA	95	$\pi^-$ emulsion 600 GeV

### $\Gamma(K^+ e^+ e^-)/\Gamma_{\text{total}}$

$\Gamma_{155}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.2 \times 10^{-6}$	90	HE	05A	CLEO $e^+ e^-$ at $\psi(3770)$

$\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$

$<2.0 \times 10^{-4}$	90	AITALA	99G	$\pi^- N$ 500 GeV
$<2.0 \times 10^{-4}$	90	FRABETTI	97B	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<4.8 \times 10^{-3}$	90	WEIR	90B	MRK2 $e^+ e^-$ 29 GeV

### $\Gamma(K^+ \mu^+ \mu^-)/\Gamma_{\text{total}}$

$\Gamma_{156}/\Gamma$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<9.2 \times 10^{-6}$	90		LINK	03F	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

$\bullet \bullet \bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet \bullet \bullet$

$<4.4 \times 10^{-5}$	90	AITALA	99G	$\pi^- N$ 500 GeV	
$<9.7 \times 10^{-5}$	90	FRABETTI	97B	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV	
$<3.2 \times 10^{-4}$	90	0	KODAMA	95	$\pi^-$ emulsion 600 GeV
$<9.2 \times 10^{-3}$	90	WEIR	90B	MRK2 $e^+ e^-$ 29 GeV	

### $\Gamma(\pi^+ e^\pm \mu^\mp)/\Gamma_{\text{total}}$

$\Gamma_{157}/\Gamma$

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<3.4 \times 10^{-5}$	90	AITALA	99G	$\pi^- N$ 500 GeV

### $\Gamma(\pi^+ e^+ \mu^-)/\Gamma_{\text{total}}$

$\Gamma_{158}/\Gamma$

A test of lepton-family-number conservation.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.1 \times 10^{-4}$	90	FRABETTI	97B	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.3 \times 10^{-3}$	90	WEIR	90B	MRK2 $e^+ e^-$ 29 GeV

$\Gamma(\pi^+ e^- \mu^+)/\Gamma_{\text{total}}$  $\Gamma_{159}/\Gamma$ 

A test of lepton-family-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.3 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.3 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

 $\Gamma(K^+ e^\pm \mu^\mp)/\Gamma_{\text{total}}$  $\Gamma_{160}/\Gamma$ 

A test of lepton-family-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<6.8 \times 10^{-5}$	90	AITALA	99G E791	$\pi^- N$ 500 GeV

 $\Gamma(K^+ e^+ \mu^-)/\Gamma_{\text{total}}$  $\Gamma_{161}/\Gamma$ 

A test of lepton-family-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.3 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.4 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

 $\Gamma(K^+ e^- \mu^+)/\Gamma_{\text{total}}$  $\Gamma_{162}/\Gamma$ 

A test of lepton-family-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.2 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.4 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

 $\Gamma(\pi^- e^+ e^+)/\Gamma_{\text{total}}$  $\Gamma_{163}/\Gamma$ 

A test of lepton-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<3.6 \times 10^{-6}$	90	HE	05A CLEO	$e^+ e^-$ at $\psi(3770)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<9.6 \times 10^{-5}$	90	AITALA	99G E791	$\pi^- N$ 500 GeV
$<1.1 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<4.8 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

 $\Gamma(\pi^- \mu^+ \mu^+)/\Gamma_{\text{total}}$  $\Gamma_{164}/\Gamma$ 

A test of lepton-number conservation.

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<4.8 \times 10^{-6}$	90		LINK	03F FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$<1.7 \times 10^{-5}$	90		AITALA	99G E791	$\pi^- N$ 500 GeV
$<8.7 \times 10^{-5}$	90		FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<2.2 \times 10^{-4}$	90	0	KODAMA	95 E653	$\pi^-$ emulsion 600 GeV
$<6.8 \times 10^{-3}$	90		WEIR	90B MRK2	$e^+ e^-$ 29 GeV

### $\Gamma(\pi^- e^+ \mu^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{165}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<5.0 \times 10^{-5}$	90	AITALA	99G E791	$\pi^- N$ 500 GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.1 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.7 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

### $\Gamma(\rho^- \mu^+ \mu^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{166}/\Gamma$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<5.6 \times 10^{-4}$	90	0	KODAMA	95	E653 $\pi^-$ emulsion 600 GeV

### $\Gamma(K^- e^+ e^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{167}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<4.5 \times 10^{-6}$	90	HE	05A CLEO	$e^+ e^-$ at $\psi(3770)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<1.2 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<9.1 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

### $\Gamma(K^- \mu^+ \mu^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{168}/\Gamma$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<1.3 \times 10^{-5}$	90		LINK	03F FOCSS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$<1.2 \times 10^{-4}$	90		FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$<3.2 \times 10^{-4}$	90	0	KODAMA	95 E653	$\pi^-$ emulsion 600 GeV
$<4.3 \times 10^{-3}$	90		WEIR	90B MRK2	$e^+ e^-$ 29 GeV

### $\Gamma(K^- e^+ \mu^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{169}/\Gamma$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.3 \times 10^{-4}$	90	FRABETTI	97B E687	$\gamma$ Be, $\bar{E}_\gamma \approx 220$ GeV
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$<4.0 \times 10^{-3}$	90	WEIR	90B MRK2	$e^+ e^-$ 29 GeV

### $\Gamma(K^*(892)^- \mu^+ \mu^+)/\Gamma_{\text{total}}$

A test of lepton-number conservation.

### $\Gamma_{170}/\Gamma$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
$<8.5 \times 10^{-4}$	90	0	KODAMA	95 E653	$\pi^-$ emulsion 600 GeV

## $D^\pm CP$ -VIOLATING DECAY-RATE ASYMMETRIES

### $A_{CP}(K_S^0 \pi^\pm)$ in $D^\pm \rightarrow K_S^0 \pi^\pm$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>-0.016 \pm 0.015 \pm 0.009</math></b>	10.6k	73 LINK	02B FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

73 LINK 02B measures  $N(D^+ \rightarrow K_S^0 \pi^+)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

### $A_{CP}(K_S^0 K^\pm)$ in $D^\pm \rightarrow K_S^0 K^\pm$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>+0.071 \pm 0.061 \pm 0.012</math></b>	949	74 LINK	02B FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$+0.069 \pm 0.060 \pm 0.015$	949	75 LINK	02B FOCS	$\gamma$ nucleus, $\bar{E}_\gamma \approx 180$ GeV
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74 LINK 02B measures  $N(D^+ \rightarrow K_S^0 K^+)/N(D^+ \rightarrow K_S^0 \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

75 LINK 02B measures  $N(D^+ \rightarrow K_S^0 K^+)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

### $A_{CP}(K^+ K^- \pi^\pm)$ in $D^\pm \rightarrow K^+ K^- \pi^\pm$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.007 \pm 0.008</math> OUR AVERAGE</b>				
$+0.014 \pm 0.010 \pm 0.008$	$43k \pm 321$	76 AUBERT	05S BABR	$e^+ e^- \approx \gamma(4S)$
$+0.006 \pm 0.011 \pm 0.005$	14k	77 LINK	00B FOCS	
$-0.014 \pm 0.029$		77 AITALA	97B E791	$-0.062 < A_{CP} < +0.034$ (90% CL)
$-0.031 \pm 0.068$		77 FRABETTI	94I E687	$-0.14 < A_{CP} < +0.081$ (90% CL)

76 AUBERT 05S measures  $N(D^+ \rightarrow K^+ K^- \pi^+)/N(D_S^+ \rightarrow K^+ K^- \pi^+)$ , the ratio of the numbers of events observed, and similarly for the  $D^-$ .

77 FRABETTI 94I, AITALA 98C, and LINK 00B measure  $N(D^+ \rightarrow K^- K^+ \pi^+)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

### $A_{CP}(K^\pm K^{*0})$ in $D^+ \rightarrow K^+ \bar{K}^{*0}$ , $D^- \rightarrow K^- K^{*0}$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b><math>0.005 \pm 0.017</math> OUR AVERAGE</b>				
$+0.009 \pm 0.017 \pm 0.007$	$11k \pm 122$	78 AUBERT	05S BABR	$e^+ e^- \approx \gamma(4S)$
$-0.010 \pm 0.050$		79 AITALA	97B E791	$-0.092 < A_{CP} < +0.072$ (90% CL)
$-0.12 \pm 0.13$		79 FRABETTI	94I E687	$-0.33 < A_{CP} < +0.094$ (90% CL)

<sup>78</sup>AUBERT 05S measures  $N(D^+ \rightarrow K^+ \bar{K}^{*0})/N(D_s^+ \rightarrow K^+ K^- \pi^+)$ , the ratio of the numbers of events observed, and similarly for the  $D^-$ .

<sup>79</sup>FRABETTI 94I and AITALA 97B measure  $N(D^+ \rightarrow K^+ \bar{K}^*(892)^0)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

### $A_{CP}(\phi\pi^\pm)$ in $D^\pm \rightarrow \phi\pi^\pm$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.001±0.015 OUR AVERAGE</b>				
+0.002±0.015±0.006	10k±136	80 AUBERT	05S BABR	$e^+ e^- \approx \gamma(4S)$
-0.028±0.036		81 AITALA	97B E791	$-0.087 < A_{CP} < +0.031$ (90% CL)
+0.066±0.086		81 FRABETTI	94I E687	$-0.075 < A_{CP} < +0.21$ (90% CL)

<sup>80</sup>AUBERT 05S measures  $N(D^+ \rightarrow \phi\pi^+)/N(D_s^+ \rightarrow K^+ K^- \pi^+)$ , the ratio of the numbers of events observed, and similarly for the  $D^-$ .

<sup>81</sup>FRABETTI 94I and AITALA 97B measure  $N(D^+ \rightarrow \phi\pi^+)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the  $D^-$ .

### $A_{CP}(\pi^+\pi^-\pi^\pm)$ in $D^\pm \rightarrow \pi^+\pi^-\pi^\pm$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>-0.017±0.042</b>	82 AITALA	97B E791	$-0.086 < A_{CP} < +0.052$ (90% CL)
82 AITALA 97B measure $N(D^+ \rightarrow \pi^+\pi^-\pi^+)/N(D^+ \rightarrow K^- \pi^+ \pi^+)$ , the ratio of numbers of events observed, and similarly for the $D^-$ .			

### $A_{CP}(K_S^0 K^\pm \pi^+ \pi^-)$ in $D^\pm \rightarrow K_S^0 K^\pm \pi^+ \pi^-$

This is the difference between  $D^+$  and  $D^-$  partial widths for these modes divided by the sum of the widths.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.042±0.064±0.022</b>	523 ± 32	LINK	05E FOCS	$\gamma A, \bar{E}_\gamma \approx 180$ GeV

## $D^+-D^-$ T-VIOLATING DECAY-RATE ASYMMETRIES

### $A_{Tviol}(K_S^0 K^\pm \pi^+ \pi^-)$ in $D^\pm \rightarrow K_S^0 K^\pm \pi^+ \pi^-$

$C_T \equiv \vec{p}_{K^+} \cdot (\vec{p}_{\pi^+} \times \vec{p}_{\pi^-})$  is a  $T$ -odd correlation of the  $K^+$ ,  $\pi^+$ , and  $\pi^-$  momenta for the  $D^+$ .  $\bar{C}_T \equiv \vec{p}_{K^-} \cdot (\vec{p}_{\pi^-} \times \vec{p}_{\pi^+})$  is the corresponding quantity for the  $D^-$ .  $A_T \equiv [\Gamma(C_T > 0) - \Gamma(C_T < 0)] / [\Gamma(C_T > 0) + \Gamma(C_T < 0)]$  would, in the absence of strong phases, test for  $T$  violation in  $D^+$  decays (the  $\Gamma$ 's are partial widths). With  $\bar{A}_T \equiv [\Gamma(-\bar{C}_T > 0) - \Gamma(-\bar{C}_T < 0)] / [\Gamma(-\bar{C}_T > 0) + \Gamma(-\bar{C}_T < 0)]$ , the asymmetry  $A_{Tviol} \equiv \frac{1}{2}(A_T - \bar{A}_T)$  tests for  $T$  violation even with nonzero strong phases.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>+0.023±0.062±0.022</b>	523 ± 32	LINK	05E FOCS	$\gamma A, \bar{E}_\gamma \approx 180$ GeV

## $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$ FORM FACTORS

$r_V \equiv V(0)/A_1(0)$  in  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$

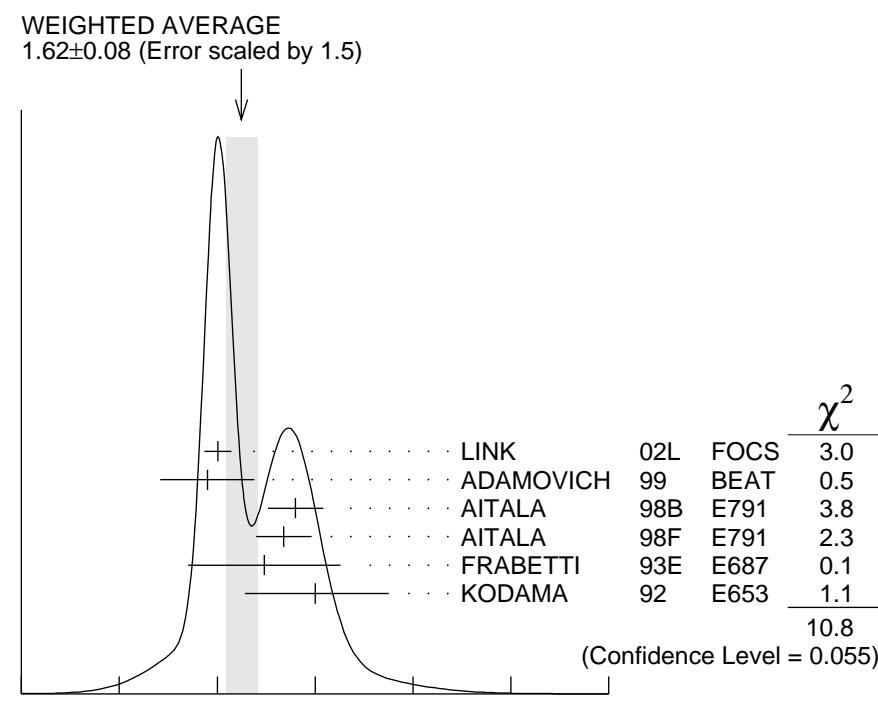
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.62 ±0.08 OUR AVERAGE</b>				Error includes scale factor of 1.5. See the ideogram below.
1.504±0.057±0.039	15k	83 LINK	02L FOCS	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.45 ±0.23 ±0.07	763	ADAMOVICH	99 BEAT	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.90 ±0.11 ±0.09	3000	84 AITALA	98B E791	$\bar{K}^*(892)^0 e^+ \nu_e$
1.84 ±0.11 ±0.09	3034	AITALA	98F E791	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.74 ±0.27 ±0.28	874	FRAZETTI	93E E687	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
2.00 $^{+0.34}_{-0.32}$ ±0.16	305	KODAMA	92 E653	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$

• • • We do not use the following data for averages, fits, limits, etc. • • •

2.0 ±0.6 ±0.3 183 ANJOS 90E E691  $\bar{K}^*(892)^0 e^+ \nu_e$

83 LINK 02L includes the effects of interference with an  $S$ -wave background. This much improves the goodness of fit, but does not much shift the values of the form factors.

84 This is slightly different from the AITALA 98B value: see ref. [5] in AITALA 98F.



$$r_V \equiv V(0)/A_1(0) \text{ in } D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$$

$r_2 \equiv A_2(0)/A_1(0)$  in  $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.83 ±0.05 OUR AVERAGE</b>				
0.875±0.049±0.064	15k	85 LINK	02L FOCS	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.00 ±0.15 ±0.03	763	ADAMOVICH	99 BEAT	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
0.71 ±0.08 ±0.09	3000	AITALA	98B E791	$\bar{K}^*(892)^0 e^+ \nu_e$

0.75 $\pm 0.08$ $\pm 0.09$	3034	AITALA	98F	E791	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
0.78 $\pm 0.18$ $\pm 0.10$	874	FRABETTI	93E	E687	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$
0.82 $^{+0.22}_{-0.23}$ $\pm 0.11$	305	KODAMA	92	E653	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0 $\pm 0.5$ $\pm 0.2$	183	ANJOS	90E	E691	$\bar{K}^*(892)^0 e^+ \nu_e$
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85 LINK 02L includes the effects of interference with an S-wave background. This much improves the goodness of fit, but does not much shift the values of the form factors.

### $r_3 \equiv A_3(0)/A_1(0)$ in $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.04 <math>\pm 0.33 \pm 0.29</math></b>	3034	AITALA	98F	$\bar{K}^*(892)^0 \mu^+ \nu_\mu$

### $\Gamma_L/\Gamma_T$ in $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>1.13 <math>\pm 0.08</math> OUR AVERAGE</b>				
1.09 $\pm 0.10 \pm 0.02$	763	ADAMOVICH	99	BEAT $\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.20 $\pm 0.13 \pm 0.13$	874	FRABETTI	93E	E687 $\bar{K}^*(892)^0 \mu^+ \nu_\mu$
1.18 $\pm 0.18 \pm 0.08$	305	KODAMA	92	E653 $\bar{K}^*(892)^0 \mu^+ \nu_\mu$

• • • We do not use the following data for averages, fits, limits, etc. • • •

1.8 $^{+0.6}_{-0.4}$ $\pm 0.3$	183	ANJOS	90E	E691	$\bar{K}^*(892)^0 e^+ \nu_e$
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### $\Gamma_+/\Gamma_-$ in $D^+ \rightarrow \bar{K}^*(892)^0 \ell^+ \nu_\ell$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.22 <math>\pm 0.06</math> OUR AVERAGE</b>				Error includes scale factor of 1.6.
0.28 $\pm 0.05 \pm 0.02$	763	ADAMOVICH	99	BEAT $\bar{K}^*(892)^0 \mu^+ \nu_\mu$
0.16 $\pm 0.05 \pm 0.02$	305	KODAMA	92	E653 $\bar{K}^*(892)^0 \mu^+ \nu_\mu$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.15 $^{+0.07}_{-0.05} \pm 0.03$	183	ANJOS	90E	E691	$\bar{K}^*(892)^0 e^+ \nu_e$
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ABLIKIM	06O	EPJ C47 31	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06P	EPJ C47 39	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06U	PL B643 246	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	06A	PRL 97 251801	N.E. Adam <i>et al.</i>	(CLEO Collab.)
AITALA	06	PR D73 032004	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
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LINK	06B	PL B637 32	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
PDG	06	JPG 33 1	W.-M. Yao <i>et al.</i>	(PDG Collab.)
RUBIN	06	PRL 96 081802	P. Rubin <i>et al.</i>	(CLEO Collab.)
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LINK	02B	PRL 88 041602	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
Also		PRL 88 159903 (erratum)	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
LINK	02E	PL B535 43	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
LINK	02F	PL B537 192	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
LINK	02I	PL B541 227	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
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AITALA	01B	PRL 86 770	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
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ABREU	00O	EPJ C12 209	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ASTIER	00D	PL B486 35	P. Astier <i>et al.</i>	(CERN NOMAD Collab.)
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ALBRECHT	94I	ZPHY C64 375	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALEEV	94	PAN 57 1370	A.N. Aleev <i>et al.</i>	(Serpukhov BIS-2 Collab.)
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BALEST	94	PRL 72 2328	R. Balest <i>et al.</i>	(CLEO Collab.)
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ADAMOVICH	93	PL B305 177	M.I. Adamovich <i>et al.</i>	(CERN WA82 Collab.)
AKERIB	93	PRL 71 3070	D.S. Akerib <i>et al.</i>	(CLEO Collab.)
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BEAN	93C	PL B317 647	A. Bean <i>et al.</i>	(CLEO Collab.)

FRAEBETTI	93E	PL B307 262	P.L. Frabetti <i>et al.</i>	(FNAL E687 Collab.)
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BARLAG	92C	ZPHY C55 383	S. Barlag <i>et al.</i>	(ACCMOR Collab.)
Also		ZPHY C48 29	S. Barlag <i>et al.</i>	(ACCMOR Collab.)
COFFMAN	92B	PR D45 2196	D.M. Coffman <i>et al.</i>	(Mark III Collab.)
DAOUDI	92	PR D45 3965	M. Daoudi <i>et al.</i>	(CLEO Collab.)
KODAMA	92	PL B274 246	K. Kodama <i>et al.</i>	(FNAL E653 Collab.)
KODAMA	92C	PL B286 187	K. Kodama <i>et al.</i>	(FNAL E653 Collab.)
ADAMOVICH	91	PL B268 142	M.I. Adamovich <i>et al.</i>	(WA82 Collab.)
ALBRECHT	91	PL B255 634	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ALVAREZ	91B	ZPHY C50 11	M.P. Alvarez <i>et al.</i>	(CERN NA14/2 Collab.)
AMMAR	91	PR D44 3383	R. Ammar <i>et al.</i>	(CLEO Collab.)
ANJOS	91C	PRL 67 1507	J.C. Anjos <i>et al.</i>	(FNAL-TPS Collab.)
BAI	91	PRL 66 1011	Z. Bai <i>et al.</i>	(Mark III Collab.)
COFFMAN	91	PL B263 135	D.M. Coffman <i>et al.</i>	(Mark III Collab.)
FRAEBETTI	91	PL B263 584	P.L. Frabetti <i>et al.</i>	(FNAL E687 Collab.)
ALVAREZ	90	ZPHY C47 539	M.P. Alvarez <i>et al.</i>	(CERN NA14/2 Collab.)
ALVAREZ	90C	PL B246 261	M.P. Alvarez <i>et al.</i>	(CERN NA14/2 Collab.)
ANJOS	90C	PR D41 2705	J.C. Anjos <i>et al.</i>	(FNAL E691 Collab.)
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ANJOS	90E	PRL 65 2630	J.C. Anjos <i>et al.</i>	(ACCMOR Collab.)
BARLAG	90C	ZPHY C46 563	S. Barlag <i>et al.</i>	(Mark II Collab.)
WEIR	90B	PR D41 1384	A.J. Weir <i>et al.</i>	(FNAL E691 Collab.)
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ANJOS	89E	PL B223 267	J.C. Anjos <i>et al.</i>	(FNAL E691 Collab.)
ADLER	88C	PRL 60 89	J. Adler <i>et al.</i>	(Mark III Collab.)
ALBRECHT	88I	PL B210 267	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
ANJOS	88	PRL 60 897	J.C. Anjos <i>et al.</i>	(FNAL E691 Collab.)
AOKI	88	PL B209 113	S. Aoki <i>et al.</i>	(WA75 Collab.)
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AGUILAR-...	87F	ZPHY C36 559	M. Aguilar-Benitez <i>et al.</i>	(LEBC-EHS Collab.)
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BARTEL	87	ZPHY C33 339	W. Bartel <i>et al.</i>	(JADE Collab.)
AGUILAR-...	86B	ZPHY C31 491	M. Aguilar-Benitez <i>et al.</i>	(LEBC-EHS Collab.)
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BARTEL	85J	PL 163B 277	W. Bartel <i>et al.</i>	(JADE Collab.)
ADAMOVICH	84	PL 140B 119	M.I. Adamovich <i>et al.</i>	(CERN WA58 Collab.)
ALTHOFF	84G	ZPHY C22 219	M. Althoff <i>et al.</i>	(TASSO Collab.)
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SCHINDLER	81	PR D24 78	R.H. Schindler <i>et al.</i>	(Mark II Collab.)
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